



ADDENDUM NO. 1

August 21, 2024

Sunrise Ranch Park Project No. 24-PK-0001

The purpose of this addendum is to officially respond to questions as they relate to the Sunrise Ranch Park project.

1. **Question:** Can you confirm that the City is taking care of all staking and not just control points?

Response: Yes, the City will provide all staking on this project.

2. **Question:** Can you confirm that an office for an owner representative is not required

Response: No office is required.

3. **Question:** Is standard temporary fence adequate or does it need to have privacy screen?

Response: Standard temporary fence is adequate.

4. **Question:** Does the City already have a SWPP and the contractor is just needing to provide QSP?

Response: Yes, please see update to Technical Specifications for Storm Water Pollution Prevention Plan. The contractor will be responsible for providing QSP for the project. The Table of Contents has been updated as well. **See Exhibit A- Technical Specifications.**

5. **Question:** Would the City be open to getting the precast cornhole boards from Outdoor Creations?

Response: Yes.

6. **Question:** Bid Item # I1 States a 120 Maintenance Period, yet the written in the "Information for Bidders" the dates indicate a 90 Day period (April 1, 2025 to June 30, 2025), which number of days is correct? Is this specifically for Plant Maintenance?

Response: The City would like to move forward with a 90 day maintenance period for plant materials.

7. **Question:** Is there a reason for not stating the working or calendar days for this contract? If there is a delay in getting the NTP, this could impact the completion date.

Response: The City's goal is to complete the park in Spring of 2025 which is why they are using a completion date rather than working days. While the desired completion date is listed the City understand there are unforeseen circumstances and will work with the awarded contractor to issues change orders if and when needed.

8. **Question:** Please advise if a Field Office is required or not per Technical Specs Section 2.2 Temporary Facilities.

Response: A Field Office is not required as part of this project or scope of work.

9. **Question:** Bid Item # E1 is for a Play Equipment Allowance, which is an amount typically set by the agency. Please provide the allowance amount for this item.

Response: While the bid item is named as an allowance, the bid item description is for a lump sum bid for all costs incurred with permitting and procuring the playground equipment listed on the plans. Please bid this item as a lump sum item.

10. **Question:** Technical Spec Section 321216 AC Paving calls for Geotextile in the AC paving section, which is not a standard practice. Per the Details on Sheet L9.0, the Geotextile is only placed in the Decomposed Granite section and does not show in the paving section. Please verify that Geotextile is NOT required under the paving section.

Response: Geotextile is not required within the AC paving section.

11. **Question:** For Class 2 Aggregate Base material, please advise if recycled Class 2 AB is allowed.

Response: For purposes of the bid, Recycled Class 2 Aggregate Base will not be considered. However, after the bid has been awarded, if cost savings is possible deduction to the City and Recycled Class 2 Aggregate Base meets Caltrans Standard Specifications, it will be considered.

12. **Question:** Is this project designed to be a balance site with no import of soil or export of soil?

Response: Please refer to note 6 on sheet L3.0

13. **Question:** What elements of the Park Sign will need to be provided by the contractor if any?

Response: The park sign is to be procured by the contractor. Installation arrangements are at the discretion of the contractor.

- 14. Question:** Will the Park Sign be delivered to the contractor or will the contractor be responsible for picking it up at a specific location?

Response: The contractor is responsible for pickup/delivery arrangements based on their abilities and coordination with the manufacturer.

- 15. Question:** Can the soil Amendment be further defined as referred to plan page L7.0 under soil preparation section 7 in the last bullet point "- Backfill Mix, 1/3 native soil, mixed with 2/3 soil amendment."

Response: The soil amendment is to be a blend of the fertilizer, soil sulfur, and organic compost to blended together to create a volume of 2/3 plant pit backfill. Contractor shall adjust quantities of fertilizer, soil sulfur, and organic compost according to the volume of the plant pit.

- 16. Question:** What is the depth or quantity of soil amendment as referred to plan page L7.0 under soil preparation section 7 in the last bullet point "- Backfill Mix, 1/3 native soil, mixed with 2/3 soil amendment."

Response: The depth/quantity of soil amendment required is based on the volume of the excavated backfilled plant pit.

- 17. Question:** Per Plan note 5 on Page E1.0 the electrical line is to be extended to the new location. Please confirm: 1. that the existing line is completed to edge of curb on the park side 2. The Depth of the line 3. That all conduit on the north side of the street is in place?

Response: Per PG&E the record drawings and splice box inspection shows a spare conduit routed across the street. With regards to depth, I would assume it would be per the PG&E Greenbook for what is allowed for secondary conduits.

- 18. Question:** Can the city further define the sumps bid item? Is there a need for an electrical sump or piping in the sump area?

Response: Bid Item #5 – Playground Sub Surface Infiltration Sumps are to be installed per Detail 5, Sheet L9.2 and in locations as shown in Detail B 'Playground Enlargement Grading Plan' on Sheet L3.0 of the Improvement Plans.

- 19. Question:** Is the city supplying and delivering the service pedestal?

Response: The City is supplying the electrical service pedestal. It is the contractor's responsibility to coordinate delivery of the pedestal to project site.

20. Question: Other than for the irrigation system, is there other electrical scopes required?

Response: The electrical scope is strictly for the irrigation system. The light poles are all future PV powered light poles which will all be installed under a different project.

21. Question: TEMPORARY FACILITIES & CONTROLS - Section 3.5 G – Please clarify Security Enclosure and Lockup: The contractor is responsible for temporary Chain Link Fencing around the perimeter of the work site. Is Section 3.5 stating that additional security fencing is required within the perimeter fencing for partially.

Response: Construction/Security fencing is to be provided around the perimeter of the project from the start of operations at the project site until project acceptance by the City. Construction/Security fencing within the perimeter of the project is not required. However, if the contractor deems additional fencing is needed during the construction process, it is to be provided at no additional cost to the City.

22. Question: TEMPORARY FACILITIES & CONTROLS - Section 3.3 F 1 – Can you please specify what type of lighting this section is referencing?

Response: Temporary lighting is not required as part of this project.

23. Question: Please provide installation detail of booster pump.

Response: Installation detail of booster pump is to be provided by the manufacturer's representative. Contractor is welcome to reach out to manufacturer representative.

24. Question: Backflow preventer model LF825Y is the threaded connection one while detail 2 sheet L10.1 is used for flanged connection backflow preventer. Please clarify.

Response: Backflow Preventer description in Irrigation Legend shall be updated to the following:

"FEBCO LF 825Y BACKFLOW PREVENTER WITH STRONG BOX SMOOTH TOUCH ENCLOSURE (MODEL: SBBC-45SS) AND POLAR PARKA WEATHER BLANKET (MODEL: PK-440). BACKFLOW AND WEATHER BLANKET TO BE INSTALLED PER DETAIL ON FOLLOWING PAGE."

25. Question: Please provide stabilized decomposed granite material.

Response: Stabilized Decomposed Granite Paving Technical Specification has been provided to be included in the Specification Book for the project. The Table of Contents has been updated as well. **See Exhibit A- Technical Specifications.**

26. Question: Please advise where class II aggregate base under decomposed granite layer gets paid for in the bid form.

Response: The Class II aggregate base under decomposed granite is to be included and paid under Bid Item #C7 – Stabilized Decomposed Granite.

This Addendum forms a part of the Proposal Documents and will be incorporated into the Contract Documents, as applicable. All other conditions of the Contract Documents remain unchanged. The following changes, additions, or deletions as set forth herein shall apply to the Contract Documents and shall be made a part thereof and shall be subject to all the requirements thereof as through originally shown and/or specified.

Proposals shall be submitted in accordance with this Addendum. All consultants **MUST** acknowledge receipt of this Addendum by signing and returning this Addendum with your Proposal.

City of Los Banos



By: Joe Heim
Parks and Recreation Director

Firm Name: _____

By: _____

Title: _____

Date: _____

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SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.

1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents.
 - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 - 2. Substitutions for Convenience: Changes proposed by Contractor or City that are not required to meet other Project requirements but may offer advantage to Contractor or City.

1.4 ACTION SUBMITTALS

- A. Substitution Requests: Submit documentation identifying product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use form provided in Project Manual or acceptable to City and/or Landscape Architect.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.
 - b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by City and separate contractors that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes, such as

- performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
- d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and the City.
 - h. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
 - i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
 - j. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - k. Cost information, including a proposal of change, if any, in the Contract Sum.
 - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
 - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. City and/or Landscape Architect's Action: If necessary, City and/or Landscape Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. City and/or Landscape Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order, Construction Change Directive, or Landscape Architect's Supplemental Instructions for minor changes in the Work.
 - b. Use product specified if Landscape Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

- A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

1.7 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
 - 1. Conditions: City and/or Landscape Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Landscape Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Substitution request is fully documented and properly submitted.
 - c. Requested substitution will not adversely affect Contractor's construction schedule.
 - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - e. Requested substitution is compatible with other portions of the Work.
 - f. Requested substitution has been coordinated with other portions of the Work.
 - g. Requested substitution provides specified warranty.
 - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Not allowed unless otherwise indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project, including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Coordination drawings.
 - 3. RFIs.
 - 4. Digital project management procedures.
 - 5. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.
- C. Related Requirements:
 - 1. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

- A. RFI: Request for Information. Request from City, Landscape Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 - 1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.
- B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list

addresses, cellular telephone numbers, and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Post copies of list in Project meeting room, in temporary field office. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.
 1. Schedule construction operations in sequence required to obtain the best results, where installation of one part of the Work depends on installation of other components, before or after its own installation.
 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 1. Prepare similar memoranda for City and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 1. Preparation of Contractor's construction schedule.
 2. Preparation of the schedule of values.
 3. Installation and removal of temporary facilities and controls.
 4. Delivery and processing of submittals.
 5. Progress meetings.
 6. Preinstallation conferences.
 7. Project closeout activities.
 8. Startup and adjustment of systems.

1.6 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 - b. Coordinate the addition of trade-specific information to coordination drawings in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
 - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 - e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
 - f. Indicate required installation sequences.
 - g. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Landscape Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:
 1. File Preparation Format:
 - a. Same digital data software program, version, and operating system as original Drawings.
 2. File Submittal Format: Submit or post coordination drawing files using format same as file preparation format and PDF format.
 3. City and/or Landscape Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.
 - a. City and/or Landscape Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
 - b. Digital Data Software Program: Drawings are available in CAD.
 - c. Contractor shall execute a data licensing agreement in the form of Agreement form acceptable to City and/or Landscape Architect.

1.7 REQUEST FOR INFORMATION (RFI)

- A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. City and/or Landscape Architect will return without response those RFIs submitted to Landscape Architect by other entities controlled by Contractor.
 2. Coordinate and submit RFIs in a prompt manner to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
 2. City name.
 3. City's Project number.
 4. Name of Landscape Architect.
 5. Landscape Architect's Project number.
 6. Date.
 7. Name of Contractor.
 8. RFI number, numbered sequentially.
 9. RFI subject.
 10. Specification Section number and title and related paragraphs, as appropriate.
 11. Drawing number and detail references, as appropriate.
 12. Field dimensions and conditions, as appropriate.
 13. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 14. Contractor's signature.
 15. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to City.
1. Attachments shall be electronic files in PDF format.
- D. City and/or Landscape Architect's Action: City and/or Landscape Architect will review each RFI, determine action required, and respond. Allow seven days for Architect's response for each RFI. RFIs received by City and/or Landscape Architect after 1:00 p.m. will be considered as received the following working day.
1. The following Contractor-generated RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Landscape Architect's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.

2. City and/or Landscape Architect's action may include a request for additional information, in which case City and/or Landscape Architect's time for response will date from time of receipt by City and/or Landscape Architect of additional information.
 3. City and/or Landscape Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify City and/or Landscape Architect in writing within 5 days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Include the following:
1. Project name.
 2. Name and address of Contractor.
 3. Name and address of City/Landscape Architect.
 4. RFI number, including RFIs that were returned without action or withdrawn.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date City and Landscape Architect's response was received.
 8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
 9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.
- F. On receipt of City and/or Landscape Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify City and/or Landscape Architect within seven days if Contractor disagrees with response.

1.8 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify City and Landscape Architect of scheduled meeting dates and times a minimum of seven days prior to meeting.
 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including City and Landscape Architect, within three days of the meeting.

- B. Preconstruction Conference: Landscape Architect and City will schedule and conduct a preconstruction conference before starting construction, at a time convenient to City and Landscape Architect, but no later than 15 days after execution of the Agreement.
1. Attendees: Authorized representatives of City, Construction Manager, Landscape Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Responsibilities and personnel assignments.
 - b. Tentative construction schedule.
 - c. Phasing.
 - d. Critical work sequencing and long lead items.
 - e. Designation of key personnel and their duties.
 - f. Lines of communications.
 - g. Use of web-based Project software.
 - h. Procedures for processing field decisions and Change Orders.
 - i. Procedures for RFIs.
 - j. Procedures for testing and inspecting.
 - k. Procedures for processing Applications for Payment.
 - l. Distribution of the Contract Documents.
 - m. Submittal procedures.
 - n. Preparation of Record Documents.
 - o. Use of the premises.
 - p. Work restrictions.
 - q. Working hours.
 - r. Responsibility for temporary facilities and controls.
 - s. Procedures for moisture and mold control.
 - t. Procedures for disruptions and shutdowns.
 - u. Construction waste management and recycling.
 - v. Parking availability.
 - w. Office, work, and storage areas.
 - x. Equipment deliveries and priorities.
 - y. First aid.
 - z. Security.
 - aa. Progress cleaning.
 3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Progress Meetings: Conduct progress meetings at regular intervals.
1. Coordinate dates of meetings with preparation of payment requests.
 2. Attendees: In addition to representatives of City and Landscape Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.

3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Deliveries.
 - 4) Off-site fabrication.
 - 5) Access.
 - 6) Site use.
 - 7) Temporary facilities and controls.
 - 8) Progress cleaning.
 - 9) Quality and work standards.
 - 10) Status of correction of deficient items.
 - 11) Field observations.
 - 12) Status of RFIs.
 - 13) Status of Proposal Requests.
 - 14) Pending changes.
 - 15) Status of Change Orders.
 - 16) Pending claims and disputes.
 - 17) Documentation of information for payment requests.
4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
 - a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
- D. Coordination Meetings: Conduct Project coordination meetings at regular intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
 1. Attendees: In addition to representatives of City and Landscape Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities

- shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
 - c. Review present and future needs of each contractor present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Deliveries.
 - 4) Off-site fabrication.
 - 5) Access.
 - 6) Site use.
 - 7) Temporary facilities and controls.
 - 8) Work hours.
 - 9) Hazards and risks.
 - 10) Progress cleaning.
 - 11) Quality and work standards.
 - 12) Status of RFIs.
 - 13) Proposal Requests.
 - 14) Change Orders.
 - 15) Pending changes.
 3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Submittal schedule requirements.
2. Administrative and procedural requirements for submittals.

B. Related Requirements:

1. Section 013100 "Project Management and Coordination" for submitting coordination drawings and subcontract list and for requirements for web-based Project software.
2. Section 017700 "Closeout Procedures" for submitting closeout submittals and maintenance material submittals.
3. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.2 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require City and/or Landscape Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. Informational Submittals: Written and graphic information and physical samples that do not require City and/or Landscape Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

1.3 SUBMITTAL SCHEDULE

- A. Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Landscape Architect and City and additional time for handling and reviewing submittals required by those corrections.
 1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
 2. Initial Submittal Schedule: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.

3. Final Submittal Schedule: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule as required to reflect changes in current status and timing for submittals.
4. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal Category: Action; informational.
 - d. Name of subcontractor.
 - e. Description of the Work covered.
 - f. Scheduled date for City and/or Landscape Architect's final release or approval.

1.4 SUBMITTAL FORMATS

- A. Submittal Information: Include the following information in each submittal:
 1. Project name.
 2. Date.
 3. Name of Landscape Architect.
 4. Name of Construction Manager.
 5. Name of City.
 6. Name of Contractor.
 7. Name of firm or entity that prepared submittal.
 8. Names of subcontractor, manufacturer, and supplier.
 9. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier and alphanumeric suffix for resubmittals.
 10. Category and type of submittal.
 11. Submittal purpose and description.
 12. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
 13. Drawing number and detail references, as appropriate.
 14. Indication of full or partial submittal.
 15. Location(s) where product is to be installed, as appropriate.
 16. Other necessary identification.
 17. Remarks.
 18. Signature of transmitter.
- B. Options: Identify options requiring selection by City and/or Landscape Architect.
- C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by City and/or Landscape Architect on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

D. Paper Submittals:

1. Place a permanent label or title block on each submittal item for identification; include name of firm or entity that prepared submittal.
2. Provide a space approximately 4 by 6 inches on label or beside title block to record Contractor's review and approval markings and action taken by City and/or Landscape Architect.
3. Action Submittals: Submit two paper copies of each submittal unless otherwise indicated. Landscape Architect, through City, will return one copy. Electronic submittals will be accepted in a PDF format and must be separated into each individual submittal number.
4. Informational Submittals: Submit two paper copies of each submittal unless otherwise indicated. Landscape Architect and City will not return copies.
5. Additional Copies: Unless additional copies are required for final submittal, and unless Landscape Architect or City observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
6. Transmittal for Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using transmittal form.

- E. PDF Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.

1.5 SUBMITTAL PROCEDURES

- A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Email: Prepare submittals as PDF package and transmit to Landscape Architect by sending via email. Include PDF transmittal form. Include information in email subject line as requested by City and/or Landscape Architect.
 - a. Landscape Architect, through City, return annotated file. Annotate and retain one copy of file as a digital Project Record Document file.
2. Paper: Prepare submittals in paper form and deliver to Landscape Architect.

- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections, so processing will not be delayed because of need to review submittals concurrently for coordination.

- a. Landscape Architect and City reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on City and/or Landscape Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 - 1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. City and/or Landscape Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 - 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 - 3. Resubmittal Review: Allow 15 days for review of each resubmittal.
 - 4. Sequential Review: Where sequential review of submittals by Landscape Architect's consultants, City, or other parties is indicated, allow 21 days for initial review of each submittal.
 - 5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Landscape Architect and to Landscape Architect's consultants, allow 15 days for review of each submittal. Submittal will be returned to City, through Landscape Architect, before being returned to Contractor.
 - a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Landscape Architect and City.
- D. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
 - 1. Note date and content of previous submittal.
 - 2. Note date and content of revision in label or title block, and clearly indicate extent of revision.
 - 3. Resubmit submittals until they are marked with approval notation from City and/or Landscape Architect's action stamp.
- E. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from City and/or Landscape Architect's stamp.

1.6 SUBMITTAL REQUIREMENTS

- A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams that show factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 5. Submit Product Data before Shop Drawings, and before or concurrently with Samples.
- B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
 2. Paper Sheet Size: Except for templates, patterns, and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 24 by 36 inches.

- C. Samples: Submit Samples for review of type, color, pattern, and texture for a check of these characteristics with other materials.
1. Transmit Samples that contain multiple, related components, such as accessories together in one submittal package.
 2. Identification: Permanently attach label on unexposed side of Samples that includes the following:
 - a. Project name and submittal number.
 - b. Generic description of Sample.
 - c. Product name and name of manufacturer.
 - d. Sample source.
 - e. Number and title of applicable Specification Section.
 - f. Specification paragraph number and generic name of each item.
 3. Email Transmittal: Provide PDF transmittal. Include digital image file illustrating Sample characteristics and identification information for record.
 4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as City's property, are the property of Contractor.
 5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units, showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Landscape Architect, through City, will return submittal with options selected.
 6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit two sets of Samples. City and/or Landscape Architect will retain 1 Sample sets; remainder will be returned.

- 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least two sets of paired units that show approximate limits of variations.
- D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
 2. Manufacturer and product name, and model number if applicable.
 3. Number and name of room or space.
 4. Location within room or space.
- E. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- F. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.
- G. Certificates:
1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.
 2. Installer Certificates: Submit written statements on manufacturer's letterhead, certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
 3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead, certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
 4. Material Certificates: Submit written statements on manufacturer's letterhead, certifying that material complies with requirements in the Contract Documents.
 5. Product Certificates: Submit written statements on manufacturer's letterhead, certifying that product complies with requirements in the Contract Documents.
 6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of AWS B2.1/B2.1M on AWS forms. Include names of firms and personnel certified.

H. Test and Research Reports:

1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for substrate preparation and primers required.
2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - a. Name of evaluation organization.
 - b. Date of evaluation.
 - c. Time period when report is in effect.
 - d. Product and manufacturers' names.
 - e. Description of product.
 - f. Test procedures and results.
 - g. Limitations of use.

1.7 CONTRACTOR'S REVIEW

- A. Action Submittals and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to City and Landscape Architect.
- B. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp. Include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
 1. City and/or Landscape Architect will not review submittals received from Contractor that do not have Contractor's review and approval.

1.8 CITY AND LANDSCAPE ARCHITECT'S REVIEW

- A. Action Submittals: City and/or Landscape Architect review each submittal, indicate corrections or revisions required, and return date.
 - 1. PDF Submittals: City and/or Landscape Architect will indicate, via markup on each submittal, the appropriate action.
 - 2. Paper Submittals: City and/or Landscape Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
- B. Informational Submittals: City and/or Landscape Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. City forward each submittal to appropriate party.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from City and/or Landscape Architect.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. City and/or Landscape Architect will discard submittals, without review, received from sources other than Contractor.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013300

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

1.2 USE CHARGES

- A. Installation, removal, and use charges for temporary facilities to be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, City, Landscape Architect, testing agencies, and authorities having jurisdiction.
- B. Water Service from Existing System: Water from City's existing water system is available for use with metering. Provide connections and extensions of services and metering as required for construction operations.

1.3 INFORMATIONAL SUBMITTALS

- A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.
- B. Implementation and Termination Schedule: Within 15 days of date established for commencement of the Work, submit schedule indicating implementation and termination dates of each temporary utility.
- C. Project Identification and Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, typestyles, graphic elements, and message content.
- D. Noise and Vibration Control Plan: Identify construction activities that may impact the adjacent existing buildings, whether occupied by others, or occupied by City. Include the following:
 - 1. Methods used to meet the goals and requirements of City.
 - 2. Concrete cutting method(s) to be used.
 - 3. Location of construction devices on the site.
 - 4. Show compliance with the use and maintenance of quieted construction devices for the duration of the Project.
 - 5. Indicate activities that may disturb building occupants and that are planned to be performed during non-standard working hours as coordinated with City.
 - 6. Indicate locations of sensitive areas or other areas requiring special attention as identified by City. Indicate means for complying with City's requirements.

1.4 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.
- C. Accessible Temporary Egress: Comply with applicable provisions in the United States Access Board's ADA-ABA Accessibility Guidelines.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch-thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; 2-3/8-inch OD line posts and 2-7/8-inch OD corner and pull posts, with 1-5/8-inch top and bottom rails. Provide galvanized-steel bases for supporting posts.
- B. Fencing Windscreen Privacy Screen: Polyester fabric scrim with grommets for attachment to chain-link fence, sized to height of fence, in color selected by City and/or Landscape Architect from manufacturer's standard colors.
- C. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flame-spread rating of 15 or less in accordance with ASTM E84 and passing NFPA 701 Test Method 2.

2.2 TEMPORARY FACILITIES

- A. Field Offices:
 - 1. Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
 - 1. Store combustible materials apart from building.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

- A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
 - 1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as City's property.

3.2 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.3 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 - 1. Arrange with utility company, City, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Drainage: Provide temporary utilities to remove effluent lawfully.
- C. Water Service:
 - 1. Install water service and distribution piping in sizes and pressures adequate for construction.
 - 2. Connect to City's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to City. At Substantial Completion, restore these facilities to condition existing before initial use.
- D. Sanitary Facilities: Provide temporary toilets, wash facilities, safety shower and eyewash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- E. Electric Power Service:
 - 1. Connect to City's new electric power service. Maintain equipment in a condition acceptable to City.

- F. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

3.4 SUPPORT FACILITIES INSTALLATION

- A. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations.
 - 1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.
- B. Traffic Controls: Comply with requirements of authorities having jurisdiction.
 - 1. Protect existing site improvements to remain, including curbs, pavement, and utilities.
 - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- C. Parking: Use designated areas of City's existing parking areas for construction personnel.
- D. Storage and Staging: Use designated areas of Project site for storage and staging needs.
- E. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
 - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
- F. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
 - 1. Identification Signs: Provide Project identification signs as indicated on Drawings.
 - 2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
 - a. Provide temporary, directional signs for construction personnel and visitors.
 - 3. Maintain and touch up signs, so they are legible at all times.
- G. Waste Disposal Facilities:
 - 1. Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction.

3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
 - 1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- C. Temporary Erosion and Sedimentation Control:
 - 1. Comply with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent and requirements specified in Section 311000 "Site Clearing."
 - 2. Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, in accordance with erosion- and sedimentation-control Drawings.
 - a. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant-protection zones.
 - b. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
 - c. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
 - d. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.
- D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- E. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals, so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using materials approved by authorities having jurisdiction.
- F. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people from easily entering site except by entrance gates.
 - 1. Extent of Fence: As indicated on Drawings.
 - 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel.

- G. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.
- H. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

3.6 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are property of Contractor. City reserves right to take possession of Project identification signs.
 - 2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
 - 3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for Contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures.
 - 2. Final Completion procedures.
 - 3. List of incomplete items.
 - 4. Submittal of Project warranties.
 - 5. Final cleaning.
- B. Related Requirements:
 - 1. Section 017839 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.

1.2 DEFINITIONS

- A. List of Incomplete Items: Contractor-prepared list of items to be completed or corrected, prepared for the Landscape Architect's use prior to Landscape Architect's inspection, to determine if the Work is substantially complete.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of cleaning agent.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.
- C. Field Report: For pest-control inspection.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items required by other Sections.

1.6 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's "punch list"), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 - 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction, permitting City unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 2. Submit closeout submittals specified in other Division 01 Sections, including Project Record Documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
 - 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by City of Los Banos. Label with manufacturer's name and model number.
 - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain City's signature for receipt of submittals.
 - 5. Submit testing, adjusting, and balancing records.
 - 6. Submit sustainable design submittals not previously submitted.
 - 7. Submit changeover information related to City's, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 - 1. Complete startup and testing of systems and equipment.
 - 2. Perform preventive maintenance on equipment used prior to Substantial Completion.
 - 3. Instruct City's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
 - 4. Advise City of changeover in utility services.
 - 5. Participate with City in conducting inspection and walkthrough with local emergency responders.
 - 6. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 - 7. Complete final cleaning requirements.
 - 8. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.

- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, City and/or Landscape Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Landscape Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Landscape Architect, that must be completed or corrected before certificate will be issued.
1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 2. Results of completed inspection will form the basis of requirements for Final Completion.

1.7 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining Final Completion, complete the following:
1. Certified List of Incomplete Items: Submit certified copy of Landscape Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by City and/or Landscape Architect. Certified copy of the list will state that each item has been completed or otherwise resolved for acceptance.
 2. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 3. Submit pest-control final inspection report.
 4. Submit Final Completion photographic documentation.
- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, City and/or Landscape Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. City and/or Landscape Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.8 LIST OF INCOMPLETE ITEMS

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
1. Organize list of spaces in sequential order,, listed by room or space number.
 2. Organize items applying to each space by major element, including categories for ceilings, individual walls, floors, equipment, and building systems.
 3. Include the following information at the top of each page:

- a. Project name.
 - b. Date.
 - c. Name of City.
 - d. Name of Landscape Architect.
 - e. Name of Contractor.
 - f. Page number.
4. Submit list of incomplete items in the following format:
 - a. PDF Electronic File: Landscape Architect, through City, will return annotated file.

1.9 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Landscape Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit City's rights under warranty.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by City during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
- D. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
 1. Submit via email to City.
- E. Warranties in Paper Form:
 1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
- F. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
 - 1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
 - a. Clean Project site of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are not planted, mulched, or paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - f. Remove debris and surface dust from limited-access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - g. Clean flooring, removing debris, dirt, and staining; clean in accordance with manufacturer's instructions.
 - h. Vacuum and mop concrete.

- i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean in accordance with manufacturer's instructions if visible soil or stains remain.
 - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - k. Remove labels that are not permanent.
 - l. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - n. Clean strainers.
 - o. Leave Project clean and ready for occupancy.
- C. Pest Control: Comply with pest control requirements in Section 015000 "Temporary Facilities and Controls." Prepare written report.
- D. Construction Waste Disposal: Comply with waste-disposal requirements in Section 015000 "Temporary Facilities and Controls."

3.2 CORRECTION OF THE WORK

- A. Complete repair and restoration operations required before requesting inspection for determination of Substantial Completion.

END OF SECTION 017700

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for Project Record Documents, including the following:
 - 1. Record Drawings.
 - 2. Record specifications.
 - 3. Record Product Data.
 - 4. Miscellaneous record submittals.
- B. Related Requirements:
 - 1. Section 017700 "Closeout Procedures" for general closeout procedures.

1.2 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit one set(s) of marked-up record prints.
 - 2. Number of Copies: Submit copies of Record Drawings as follows:
 - a. Initial Submittal:
 - 1) Submit PDF electronic files of scanned record prints and one set(s) of file prints.
 - b. Final Submittal:
 - 1) Submit PDF electronic files of scanned Record Prints and three set(s) of file prints.
 - c. Final Submittal:
 - 1) Submit Record Digital Data Files and three set(s) of Record Digital Data File plots.
- B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and Contract modifications.
- C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.
 - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.
- D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit annotated PDF electronic files and directories of each submittal.

- E. Reports: Submit written report indicating items incorporated into Project Record Documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

1.3 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
 - 1. Preparation: Mark record prints to show the actual installation, where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an acceptable drawing technique.
 - c. Record data as soon as possible after obtaining it.
 - d. Record and check the markup before enclosing concealed installations.
 - e. Cross-reference record prints to corresponding photographic documentation.
 - 2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or Construction Work Change Directive.
 - k. Changes made following Landscape Architect's written orders.
 - l. Details not on the original Contract Drawings.
 - m. Field records for variable and concealed conditions.
 - n. Record information on the Work that is shown only schematically.
 - 3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
 - 4. Mark record prints with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 - 5. Mark important additional information that was either shown schematically or omitted from original Drawings.

6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with City and/or Landscape Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
1. Format: Same digital data software program, version, and operating system as for the original Contract Drawings.
 2. Format: DWG, Microsoft Windows operating system.
 3. Format: Annotated PDF electronic file with comment function enabled.
 4. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
 5. Refer instances of uncertainty to Landscape Architect through City for resolution.
 6. City and/or Landscape Architect will furnish Contractor with one set of digital data files of the Contract Drawings for use in recording information.
 - a. See Section 013100 "Project Management and Coordination" for requirements related to use of City and/or Landscape Architect's digital data files.
- C. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 2. Format: Annotated PDF electronic file with comment function enabled.
 3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
 4. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of City.
 - e. Name of Landscape Architect.
 - f. Name of Contractor.

1.4 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation, where installation varies from that indicated in Specifications, addenda, and Contract modifications.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.

2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
5. Note related Change Orders, Record Product Data, and Record Drawings where applicable.

- B. Format: Submit record specifications as annotated PDF electronic file.

1.5 RECORD PRODUCT DATA

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and revisions to Project Record Documents as they occur; do not wait until end of Project.
- B. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 3. Note related Change Orders, Record Specifications, and Record Drawings where applicable.
- C. Format: Submit Record Product Data as annotated PDF electronic file.
1. Include Record Product Data directory organized by Specification Section number and title, electronically linked to each item of Record Product Data.

1.6 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
- B. Format: Submit miscellaneous record submittals as PDF electronic file.
1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

1.7 MAINTENANCE OF RECORD DOCUMENTS

- A. Maintenance of Record Documents: Store Record Documents in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for City and/or Landscape Architect's reference during normal working hours.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017839

SECTION 033000 - CAST-IN-PLACE CONCRETE**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.
- B. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Concrete Subcontractor.
 - c. Special concrete finish Subcontractor.
 - d. City and/or Landscape Architect
 - 2. Review the following:
 - a. Special inspection and testing and inspecting agency procedures for field quality control.
 - b. Construction joints, control joints, isolation joints, and joint-filler strips.
 - c. Semirigid joint fillers.
 - d. Vapor-retarder installation.
 - e. Anchor rod and anchorage device installation tolerances.
 - f. Cold and hot weather concreting procedures.

- g. Concrete finishes and finishing.
- h. Curing procedures.
- i. Forms and form-removal limitations.
- j. Concrete repair procedures.
- k. Concrete protection.
- l. Initial curing and field curing of field test cylinders (ASTM C31/C31M.)
- m. Protection of field cured field test cylinders.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.
- C. Shop Drawings:
 - 1. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
 - a. Location of construction joints is subject to approval of the City and/or Landscape Architect.
- D. Concrete Schedule: For each location of each Class of concrete indicated in "Concrete Mixtures" Article, including the following:
 - 1. Concrete Class designation.
 - 2. Location within Project.
 - 3. Exposure Class designation.
- E. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, materials, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs Project personnel qualified as an ACI-certified Flatwork Technician and Finisher and a supervisor who is a certified ACI Flatwork Concrete Finisher/Technician or an ACI Concrete Flatwork Technician with experience installing and finishing concrete.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.

1. Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Source Limitations: Obtain each type or class of cementitious material from the same brand form the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D1.4M, Structural Welding Code – Reinforcing Steel".

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Comply with ASTM C94/C94M and ACI 301.

1.8 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 301 and ACI 306.1 and as follows.
 1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 2. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
 3. Do not use frozen materials or materials containing ice or snow.
 4. Do not place concrete in contact with surfaces less than 35 deg F, other than reinforcing steel.
 5. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1, and as follows:
 1. Maintain concrete temperature at time of discharge to not exceed 95 deg F.
 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

1.9 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to furnish replacement sheet vapor retarder/termite barrier material and accessories for sheet vapor retarder/ termite barrier and accessories that do not comply with requirements or that fail to resist penetration by termites within specified warranty period.
 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with ACI 301 unless modified by requirements in the Contract Documents.

2.2 CONCRETE MATERIALS

A. Source Limitations:

1. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.
2. Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant.
3. Obtain aggregate from single source.
4. Obtain each type of admixture from single source from single manufacturer.

B. Cementitious Materials:

1. Portland Cement: ASTM C150/C150M, gray.
2. Fly Ash: ASTM C618, Class C or F.

C. Normal-Weight Aggregates: ASTM C33/C33M, coarse aggregate or better, graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 1 inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Air-Entraining Admixture: ASTM C260/C260M.

2.3 CURING MATERIALS

- A. Water: Potable or complying with ASTM C1602/C1602M.

2.4 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber or ASTM D1752, cork or self-expanding cork.
- B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 in accordance with ASTM D2240.
- C. Bonding Agent: ASTM C1059/C1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

- D. Epoxy Bonding Adhesive: ASTM C881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade and class to suit requirements, and as follows:
 - 1. Types I and II, nonload bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.5 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent elevations.
 - 1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
 - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand, as recommended by underlayment manufacturer.
 - 4. Compressive Strength: Not less than 4100 psi at 28 days when tested in accordance with ASTM C109/C109M.

2.6 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301.
 - 1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.

2.7 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94/C94M, and furnish batch ticket information.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions:
 - 1. Before placing concrete, verify that installation of concrete forms, accessories, and reinforcement, and embedded items is complete and that required inspections have been performed.
 - 2. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide reasonable auxiliary services to accommodate field testing and inspections, acceptable to testing agency, including the following:
 - 1. Daily access to the Work.
 - 2. Incidental labor and facilities necessary to facilitate tests and inspections.

3.3 INSTALLATION OF EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete.
 - 1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.

3.4 JOINTS

- A. Construct joints true to line, with faces perpendicular to surface plane of concrete.

3.5 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.
 - 1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
 - 2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.
- B. Notify City and/or Landscape Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.
- C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by City and/or Landscape Architect in writing, but not to exceed the amount indicated on the concrete delivery ticket.
- D. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301, but not to exceed the amount indicated on the concrete delivery ticket.
- E. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.
 - 1. If a section cannot be placed continuously, provide construction joints as indicated.

2. Deposit concrete to avoid segregation.
 3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
- F. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Do not place concrete floors and slabs in a checkerboard sequence.
 2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 3. Maintain reinforcement in position on chairs during concrete placement.
 4. Screed slab surfaces with a straightedge and strike off to correct elevations.
 5. Level concrete, cut high areas, and fill low areas.
 6. Slope surfaces uniformly to drains where required.
 7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
 8. Do not further disturb slab surfaces before starting finishing operations.

3.6 FINISHING FORMED SURFACES

- A. Medium Broom Finish: Apply the following to as cast surface finishes where indicated on Drawings:
1. Medium Broom Finish:
 - a. Perform immediately after float finishing.
 - b. Slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route until producing a uniform texture.
 - c. Maintain required patterns or variances as shown on Drawings or to match mockups.

3.7 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

- A. Filling In:
1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
 2. Mix, place, and cure concrete, as specified, to blend with in-place construction.
 3. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations:
1. Coordinate sizes and locations of concrete bases with actual equipment provided.

2. Construct concrete bases 4 inches high unless otherwise indicated on Drawings, and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated on Drawings, or unless required for seismic anchor support.
3. Minimum Compressive Strength: 2500 psi at 28 days.
4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.
6. Prior to pouring concrete, place and secure anchorage devices.
 - a. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - b. Cast anchor-bolt insert into bases.
 - c. Install anchor bolts to elevations required for proper attachment to supported equipment.

3.8 CONCRETE CURING

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
 1. Comply with ACI 301 and ACI 306.1 for cold weather protection during curing.
 2. Comply with ACI 301 and ACI 305.1 for hot-weather protection during curing.
 3. Maintain moisture loss no more than 0.2 lb/sq. ft. x h before and during finishing operations.

3.9 TOLERANCES

- A. Conform to ACI 117.

3.10 JOINT FILLING

- A. Prepare, clean, and install joint filler in accordance with manufacturer's written instructions.
 1. Defer joint filling until concrete has aged at least one month(s).
 2. Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints.
- D. Overfill joint, and trim joint filler flush with top of joint after hardening.

3.11 CONCRETE SURFACE REPAIRS

A. Defective Concrete:

1. Repair and patch defective areas when approved by City and/or Landscape Architect.
2. Remove and replace concrete that cannot be repaired and patched to City and/or Landscape Architect's approval.

B. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete.
 - a. Limit cut depth to 3/4 inch.
 - b. Make edges of cuts perpendicular to concrete surface.
 - c. Clean, dampen with water, and brush-coat holes and voids with bonding agent.
 - d. Fill and compact with patching mortar before bonding agent has dried.
 - e. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement, so that, when dry, patching mortar matches surrounding color.
 - a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.
 - b. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that will affect concrete's durability and structural performance as determined by City and/or Landscape Architect.

C. Perform structural repairs of concrete, subject to City and/or Landscape Architect's approval, using epoxy adhesive and patching mortar.

D. Repair materials and installation not specified above may be used, subject to City and/or Landscape Architect's approval.

3.12 FIELD QUALITY CONTROL

A. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M shall be performed in accordance with the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
 - a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
2. Slump: ASTM C143/C143M:
 - a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - b. Perform additional tests when concrete consistency appears to change.
3. Unit Weight: ASTM C567/C567M fresh unit weight of structural lightweight concrete.
 - a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Compression Test Specimens: ASTM C31/C31M:
 - a. Cast, initial cure, and field cure two sets of two standard cylinder specimens for each composite sample.
5. Compressive-Strength Tests: ASTM C39/C39M.
 - a. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
6. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
7. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi if specified compressive strength is 5000 psi, or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi.
8. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by City and/or Landscape Architect but will not be used as sole basis for approval or rejection of concrete.
9. Additional Tests:
 - a. Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by City and/or Landscape Architect.

- b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by City and/or Landscape Architect.
 - 1) Acceptance criteria for concrete strength shall be in accordance with ACI 301 section 1.6.6.3.
- 10. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- 11. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

3.13 PROTECTION

A. Protect concrete surfaces as follows:

- 1. Protect from petroleum stains.
- 2. Diaper hydraulic equipment used over concrete surfaces.
- 3. Prohibit vehicles from interior concrete slabs.
- 4. Prohibit use of pipe-cutting machinery over concrete surfaces.
- 5. Prohibit placement of steel items on concrete surfaces.
- 6. Prohibit use of acids or acidic detergents over concrete surfaces.

END OF SECTION 033000

SECTION 116800 - PLAY FIELD EQUIPMENT AND STRUCTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes playground equipment as follows:

- 1. Freestanding playground equipment.
- 2. Composite playground equipment.

1.3 DEFINITIONS

- A. Definitions in ASTM F1487 apply to Work of this Section.
- B. IPEMA: International Play Equipment Manufacturers Association.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each type of playground equipment.
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Include fall heights and use zones for playground equipment, coordinated with the critical-height values of protective surfacing specified in Section 321816.13 "Playground Protective Surfacing."
- C. Samples for Initial Selection: For each type of exposed finish.
 - 1. Manufacturer's color charts.
 - 2. Include Samples of accessories involving color selection.
- D. Samples for Verification: For each type of exposed finish on the following products:
 - 1. Include Samples of accessories to verify color and finish selection.
 - 2. Posts and Rails: Minimum 6 inches long.
 - 3. Platforms: Minimum 6 inches square.
 - 4. Molded Plastic: Minimum 3 inches square.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, manufacturer, and testing agency.
- B. Product Certificates: For each type of playground equipment.
- C. Material Certificates: For the following items:
 - 1. Shop finishes.
- D. Field quality-control reports.
- E. Sample Warranty: For manufacturer's special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For playground equipment and finishes to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm whose playground equipment components have been certified by IPEMA's third-party product certification service.
- B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of playground equipment that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures.
 - b. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain playground equipment from single source from single manufacturer.

- B. Playground equipment and components shall have the IPEMA Certification Seal.

2.2 PERFORMANCE REQUIREMENTS

- A. Safety Standard: Provide playground equipment according to ASTM F1487.

2.3 FREESTANDING PLAYGROUND EQUIPMENT

- A. Playground Equipment.

- 1. Basis-of-Design Product: Subject to compliance with requirements, provide composite playground equipment structures as indicated on Drawings from the following company:
 - a. Manufacturer: As indicated on Drawings or approved equal.
 - b. Color: As indicated on Drawings.

- B. Exercise Equipment.

- 1. Basis-of-Design Product: Subject to compliance with requirements, provide composite playground equipment structures as indicated on Drawings from the following company:
 - a. Manufacturer: As indicated on Drawings or approved equal.
 - b. Color: As indicated on Drawings.

2.4 COMPOSITE PLAYGROUND EQUIPMENT

- A. Composite Play Structure: Integral play assembly that provides more than one play activity; manufactured as a system or assembled from manufacturer's standard modular-sized units.

- 1. Basis-of-Design Product: Subject to compliance with requirements, provide composite playground equipment structures as indicated on Drawings from the following company:
 - a. Manufacturer: As indicated on Drawings or approved equal.
 - b. Color: As indicated on Drawings.

2.5 FABRICATION

- A. Provide sizes, strengths, thicknesses, wall thickness, and weights of components as required to comply with requirements in ASTM F1487. Factory drill components for field assembly. Unnecessary holes in components, not required for field assembly, are not permitted. Provide complete play structures, including supporting members and connections, means of access and egress, designated play surfaces, barriers, guardrails, handrails, handholds, and other components indicated or required for equipment indicated.
- B. Metal Frame: Fabricate main-frame upright support posts from metal pipe or tubing with cross-section profile and dimensions as required. Unless otherwise indicated, provide each pipe or tubing main-frame member with manufacturer's standard

drainable bottom plate or support flange. Fabricate secondary frame members, bracing, and connections from either steel or aluminum.

- C. Composite Frame: Fabricate main-frame upright support posts from metal and plastic. Fabricate secondary frame members, bracing, and connections from either steel or aluminum.
- D. Play Surfaces: Manufacturer's standard elevated drainable decks, platforms, landings, walkways, ramps, and similar transitional play surfaces, designed to withstand loads; fabricated from perforated or expanded metal polyethylene panel or plank made into floor units with slip-resistant finish. Fabricate units in modular sizes and shapes to form assembled play surfaces indicated.
- E. Protective Barriers: Fabricate according to ASTM F1487. Extend barriers to height above the protected elevated surface according to requirements for use by age group indicated. Fabricate from one or more of the following:
 - 1. Welded-metal pipe or tubing with vertical bars.
 - 2. Steel sheet with openings for vision and ventilation.
 - 3. Metal-pipe or -tubing frame with wire-mesh infill panels.
 - 4. Opaque plastic panels.
- F. Guardrails: Provide guardrails configured to completely surround the protected area, except for access openings. Fabricate from welded metal pipe or tubing. Extend guardrails according to requirements for use by age group indicated.
- G. Handrails: Welded metal pipe or tubing, maximum OD between 0.95 and 1.55 inches.
 - 1. Provide handrails at heights to comply with requirements for use by age group indicated according to ASTM F1487.
- H. Roofs and Canopies: Designed to discourage and minimize climbing by users.
 - 1. Fabricated from polyethylene.
- I. Signs: Manufacturer's standard sign panels, attached to freestanding, upright support posts.
 - 1. Text: Minimum informational content according to ASTM F1487.
 - 2. Colors: Manufacturer's designation unless indicated on Drawings.

2.6 MATERIALS

- A. Aluminum: Material, alloy, and temper recommended by manufacturer for type of use and finish indicated.
- B. Steel: Material types, alloys, and forms recommended by manufacturer for type of use and finish indicated, hot-dip galvanized.
- C. Stainless-Steel Sheet: Type 304; finished on exposed faces with No. 2B finish.

- D. Opaque Plastics: Color impregnated, UV stabilized, and mold resistant.
- E. Iron Castings and Hangers: Malleable iron, ASTM A47/A47M, Grade 32510, hot-dip galvanized.
- F. Post Caps: Color-impregnated, UV-stabilized, mold-resistant polyethylene or polypropylene; color to match posts.
- G. Platform Clamps and Hangers: Manufacturer's standard; commercial-quality; corrosion-resistant; hot-dip galvanized steel and iron, stainless steel, or aluminum; of a vandal-resistant design.
- H. Hardware: Manufacturer's standard; commercial-quality; corrosion-resistant; hot-dip galvanized steel and iron, stainless steel, or aluminum; of a vandal-resistant design.
- I. Fasteners: Manufacturer's standard; corrosion-resistant; hot-dip galvanized or zinc-plated steel and iron, or stainless steel; permanently capped; and theft resistant.

2.7 CAST-IN-PLACE CONCRETE

- A. Concrete Materials and Properties: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight concrete with minimum 28-day compressive strength of 3000 psi, 3-inch slump, and 1-inch- maximum-size aggregate.
- B. Concrete Materials and Properties: Dry-packaged concrete mix complying with ASTM C387/C387M and mixed at site with potable water, according to manufacturer's written instructions, for normal-weight concrete with minimum 28-day compressive strength of 3000 psi, 3-inch slump, and 1-inch- maximum-size aggregate.

2.8 IRON AND STEEL FINISHES

- A. Powder-Coat Finish: After cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat to a minimum dry film thickness of 2 mils. Comply with coating manufacturer's written instructions for pretreatment, applying, and baking.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for earthwork, subgrade elevations, surface and subgrade drainage, and other conditions affecting performance of the Work.
 - 1. Do not begin installation before final grading required for placing playground equipment and protective surfacing is completed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written installation instructions for each equipment type unless more stringent requirements are indicated. Anchor playground equipment securely, positioned at locations and elevations indicated.
 - 1. Maximum Equipment Height: Coordinate installed fall heights of equipment with finished elevations and critical-height values of protective surfacing. Set equipment so fall heights and elevation requirements for age group use and accessibility are within required limits. Verify that playground equipment elevations comply with requirements for each type and component of equipment.
- B. Post and Footing Excavation: Excavate holes for posts and footings as indicated in firm, undisturbed or compacted subgrade soil.
- C. Post Set on Subgrade: Level bearing surfaces with drainage fill to required elevation.
- D. Post Set with Concrete Footing: Comply with Section 033000 "Cast-in-Place Concrete" for measuring, batching, mixing, transporting, forming, and placing concrete.
 - 1. Set equipment posts in concrete footing. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at the correct angle, alignment, height, and spacing.
 - a. Place concrete around posts and vibrate or tamp for consolidation. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.
 - 2. Embedded Items: Follow equipment manufacturer's written instructions and drawings to ensure correct installation of anchorages for equipment.
 - 3. Finishing Footings: Smooth top, and shape to shed water.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform the following tests and inspections.
 - 1. Perform inspection and testing for each type of installed playground equipment according to ASTM F1487.
- C. Playground equipment items will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.
- E. Notify City 48 hours in advance of date(s) and time(s) of testing and inspection.

END OF SECTION 116800

SECTION 260500 -- BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes

1. Provide all labor, materials and equipment necessary to complete the installation required for the items specified under Division 26.
2. Division 26 when referenced refers to the following Sections:
 - a. Section 260500 Basic Electrical Materials and Methods
 - b. Section 260526 Grounding and Bonding for Electrical Systems
 - c. Section 260519 Conductors and Cables
 - d. Section 260533 Raceway and Boxes

B. Related work under this section

1. Labor and materials required to furnish and install the electrical systems in a complete and operational fashion.
2. Carpentry, masonry, steel and concrete materials and labor required for construction of proper stands, bases and supports for electrical materials and equipment.
3. Excavating, pumping and backfilling required for installation.
4. Repair of damage to the premises resulting from construction activities under this Section to City's satisfaction.
5. Removal of work debris from construction activities to City's satisfaction.
6. Testing and cleaning of equipment installed.

C. Related sections

1. Where items specified in other Division 26 sections conflict with the requirements of this Section, the most stringent requirement shall govern.
2. The requirements of this Section apply to all Division 26 work, as applicable.

1.2 REFERENCES

A. Comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified:

1. CCR –California Code of Regulations
 - a. Title 8 –Industrial Relations; Section 1 –Department of Industrial Relations
 - 1) Chapter 3.2 -California Occupational Safety and Health Regulations (CAL/OSHA)
 - b. Chapter 4 –Section of Industrial Safety
 - 1) Subchapter 4 -Construction Safety Orders (CSO)
 - c. Subchapter 5 -Electrical Safety Orders (ESO)

- d. Title 24 –California Building Standards
 - 1) Part 1 -Building Standards Administrative Code
 - e. Part 2 -California Building Code (CBC); International Building Code (IBC) with California amendments
 - f. Part 3 -California Electrical Code(CEC); NFPA 70 National Electrical Code (NEC) with California amendments
 - g. Part 4 -California Mechanical Code (MEC); IAPMO Uniform Mechanical Code (UMC) with California amendments
 - h. Part 5 -California Plumbing Code; IAPMO Uniform Plumbing Code (UPC) with California amendments
 - i. Part 6 -California Energy Code
 - j. Part 7 -California Elevator Safety Construction Code
 - k. Part 9 -California Fire Code; International Fire Code (IFC) with California amendments
 - l. Part 12 -California Reference Standards Code
- 2. CPUC –California Public Utilities Commission
 - a. GO-95; Rules for Overhead Electric Line Construction
 - b. GO-128; Rules for Construction of Underground Electric Supply and Communication Systems
- 3. IEEE –Institute of Electrical and Electronic Engineers
 - a. C2; National Electrical Safety Code (NESC)
- 4. NECA –National Electrical Contractors Association
 - a. 1; Standard Practices for Good Workmanship in Electrical Contracting
 - b. 4090; Manual of Labor Units
- 5. All applicable local municipal codes and ordinances.
 - 6. Applicable rules and regulations of local utility companies.

1.3 SUBMITTALS

- A. Product Data
 - 1. Refer to Division 1.
- B. Closeout Submittal
 - 1. Furnish three complete sets of maintenance and operating instructions bound in a binder and indexed to City. Start compiling data upon approval of materials and equipment. Final inspection will not be made until Engineer approves binders. Refer also to Division 1 for additional requirements.
 - 2. Provide one of each tool required for proper equipment operation and maintenance provided under this Division. All tools shall be delivered to the City at project completion.

3. Provide two keys to City for each lock furnished under Division 26.
4. As-Built Drawings
 - a. Refer to Division 1.

1.4 SUBSTITUTIONS

- A. Refer to Division 1.

1.5 CHANGE ORDER PROPOSALS

- A. Refer to Division 1.

1.6 QUALITY ASSURANCE

- A. References to codes, standards, specifications and recommendations of technical societies, trade organizations and governmental agencies shall mean that latest edition of such publications adopted and published prior to bid submittal. Such codes or standards shall be considered a part of this Specification as though fully repeated herein.
- B. Work and materials shall be in full accordance with the latest rules and regulations of applicable state or local laws or regulations and standards of following:
 1. National Fire Protection Association (NFPA)
 2. California Electrical Code (CEC)
 3. California Occupational Safety Health Act (Cal-OSHA)
 4. California State Fire Marshall (CSFM)
 5. California Code of Regulations (CCR)
 6. Electrical Safety Orders, CAC Title 8 (ESO)
 7. California Public Utilities Commissions, General Order 95 (GO-95)
 8. Applicable rules and regulations of local utility companies.
 9. NECA 1-2006, Standard Practices for Good Workmanship in Electrical Contracting
- C. All electrical equipment and material furnished under Division 26 shall conform to all CEC requirements and bear the Underwriters' Laboratories (UL) label where applicable.

- D. Nothing in the Construction Documents shall be construed to permit work not conforming to these Codes. Whenever the indicated material, workmanship, arrangement or construction is of high quality or capacity than that required by the above rules and regulations, the Construction Documents shall take precedence. Should there be any direct conflict between the rules and regulations and Construction Documents, the rules shall govern.
- E. All electrical equipment and material furnished under this Division shall conform to NEMA and ASTM standards, CEC and bear the Underwriters' Laboratories (UL) label where such label is applicable.
- F. All electrical work shall conform to manufacturer's written instruction, and the NECA Standard Practices for Good Workmanship in Electrical Contracting and all published recommended practices at the time of project. The Contractor shall use the requirements within the Specifications whenever they exceed NECA guidelines.
- G. Follow manufacturer's direction where these direction cover points not included with the Construction Documents.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Packing, shipping, handling and unloading
 - 1. Damage to the equipment delivered to the site or in transit to the job shall be the responsibility of the Electrical Contractor.
 - 2. Equipment and material delivery shall be scheduled as required for timely, expeditious work progress.
- B. Storage and protection of job equipment is the responsibility Contractor.

1.8 PROJECT CONDITIONS

- A. Discrepancies
 - 1. In the event of discrepancies with the Contract Documents, Engineer shall be notified with sufficient time as stated within Division 1 to allow the issuing of an addendum prior to the bid opening.
 - 2. If, in the event that time does not permit notification of clarification of discrepancies prior to the bid opening, the following shall apply:
 - a. The drawings govern in matters of quantity and specifications govern in matters of quality.
 - b. In the event of conflict within the drawings and specifications involving quantities or quality, the greater quantity or higher quality shall apply. Such discrepancies shall be noted and clarified within the contractor's bid. No additional allowances will be made because of errors, ambiguities, or omissions that should have been discovered during the bid preparation.

- B. Verify all power and communication utilities' requirements prior to commencement of any utility work. Make proper adjustments to the construction to satisfy the serving utility.
- C. Information shown relative to services is based upon available records and data, but shall be regarded as approximate only. Make minor deviations found necessary to conform to actual locations and conditions without extra cost. Verify locations and elevations of utilities prior to commencement of excavation for new underground installation.
- D. Exercise extreme care in excavating near existing utilities to avoid any damage thereto; be responsible for any damage caused by such operations. Contact all utility companies to obtain exact locations prior to commencement of construction.
- E. The electrical plans indicate the general layout and arrangement; the field conditions shall determine exact locations. Field verify all conditions and modify as required to satisfy design intent. Maintain all required working clearances.
- F. Fees, permits and utility services
 - 1. Obtain and pay for all permits and service charges required for the installation of this work. Arrange for required inspections and secure approvals from authorities having jurisdiction. Arrange for all utility connections and pay charges incurred including excess service charges if any.
 - 2. Extra charges imposed by the electrical and communication utility companies shall be included in the bid, if available. Unless otherwise stated, these charges will be assumed to include in the bid.
- G. Provide and maintain temporary construction power. The General Contractor will pay for electric energy charges. Should the Electrical Contractor be the prime contractor, the Electrical Contractor shall pay for energy charges unless negotiated with City.

1.9 SEQUENCING

- A. Coordinate work within phasing plans as provided by the City.

1.10 WARRANTY

- A. Refer to Division 1.

PART 2 -PRODUCTS

2.1 MATERIALS

- A. Materials mentioned herein or on Drawings require that the items be provided and of quality noted or an approved equal. All materials shall be new, full weight, standard

in all respects and in first-class condition. Insofar as possible, all materials used shall be of the same brand or manufacturer throughout for each class of material or equipment.

- B. Trade names or catalog numbers stated herein indicate grade or quality of material desired. Materials, where applicable, shall be UL labeled and in accordance with NEMA standards.
- C. Dimensions, sizes and capacities shown are a minimum. Do not make changes without written permission of Engineer

2.2 CONCRETE

- A. All concrete work shall comply with all applicable requirements of CalTrans Standard Specifications, which is 3,000 psi at 28 days.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine Construction Documents and Site; be familiar with types of construction where electrical installation is involved. Note carefully other sections of Specifications with their individual cross-references, standard details, etc.
- B. Any electrical work or materials shown either in Construction Documents, but not mentioned herein, or vice versa, shall be executed the same as if mentioned herein, in a workmanlike manner in accordance with all published NECA Standards of Installation.
- C. Coordinate work with other crafts to avoid conflicts, and check all outlet locations with drawings and specifications. Make minor adjustments without additional cost to City.
- D. Engineer will make clarifications and rulings concerning any obvious discrepancies or omissions in work prior and after bidding. Perform all work involved in correcting obvious errors or omissions after award of contract as directed by Engineer at Contractor's expense.
- E. Examine site dimensions and locations against Drawings and become informed of all conditions under which work is to be done before submitting proposals. No allowance will be made for extra expense due to error.
- F. Layouts of equipment, accessories and wiring systems are diagrammatic (not pictorial), but shall be followed as closely as possible. Construction Documents are for assistance and guidance, and exact locations, distance,

levels, etc., will be governed by construction; accept same with this under standing.

- G. Horsepower of motors or wattage of equipment indicated in Construction Documents is estimated horsepower or wattage requirement of equipment furnished under other sections of Specifications. Size all feeders (conduit and wiring), motor starters, overload protection and circuit breakers to suit horsepower of motors or wattage of equipment actually furnished under various sections of specifications. However, in no case shall feeders and branch circuits (conduit and wiring) and circuit breakers be of smaller capacities or sizes than those indicated on Drawings or specified, unless approved in writing by Engineer.

3.2 PREPARATION

- A. Seal all exterior wall penetrations in an approved watertight manner and to the satisfaction of Engineer and City.
- B. Channels, joiners, hangers, caps, nuts and bolts and associated parts shall be plated electrolytically with zinc followed immediately thereafter by treating freshly deposited zinc surfaces with chromic acid to obtain a surface which will not form a white deposit on surface for an average of 120 hours when subjected to a standard salt spray cabinet test, or shall be hot dipped galvanized

3.3 INSTALLATION

- A. Equipment identification
1. Properly identify panelboards, remote control switches, push buttons, terminal boxes, etc. with a descriptive nameplate. Make nameplate with 3/32" laminated plastic with black background and white letters. Machine engraved letters 1/8" high for equipment in device box(es) and 1/4" high for panelboards, terminal cabinets or larger items. Punched strip type nameplates and cardholders in any form are not acceptable. Fasten nameplates with oval head machine screws, tapped into front cover/panel.
- B. Working spaces
1. Provide adequate working space around electrical equipment in compliance with Article 4 of Electrical Safety Orders and CEC 110.26. In general provide 78" of headroom and 30" wide minimum clear workspace in front of panelboards and controls. In addition to the above, provide the following minimum working clearances:
 - a. 0V – 150V (line-to-ground) provide 36" minimum clear distance.
 - b. 151V – 600V (line-to-ground) provide 42" minimum clear distance.
- C. Equipment supports

1. Anchor all electrical equipment to structure. Support systems shall be adequate to withstand seismic forces per CBC.
- D. Excavating and backfilling
 1. Excavate and backfill as required for installation of Work. Restore all surfaces, roadways, walks, curbs, walls existing underground installations, etc., cut by installations to original condition in an acceptable manner. Maintain all warning signs, barricades, flares and lanterns as required by ESO and local ordinances.
 2. Dig trenches straight and true to line and grade, with bottom clear of any rock points. Support conduit for entire length on undisturbed original earth. Minimum conduit depth of pipe crown shall per Drawings.
- E. Forming, cutting and patching
 1. In new construction, General Contractor shall provide any special forming, recesses, chased, etc., and provide wood blocking, backing and grounds as necessary for the proper installation of electrical work. Be responsible for notifying General Contractor that such provision is necessary; layout work and check to see that it suits his requirements.
 - a. Provide metal backing plates, anchor plates and such that are required for anchorage of electrical work under Division 26; securely weld or bolt to metal framing. Wood blocking or backing will not be permitted in combination with metal framing.
 2. Be responsible for proper placement of pipe sleeves, hangers, inserts and supports for this Work.
- F. Concrete work
 1. Provide concrete work related solely to electrical work. Concrete work, including forming and reinforcing steel installed for all electrical work.

3.4 REPAIR/RESTORATION

- A. Cutting, patching and repairing of existing construction to permit installation of work under Division 26 is the responsibility of Contractor. Repair or replace all damage to existing work in kind to City's satisfaction.
- B. Obtain Engineer's approval prior to performing any cutting or patching of concrete, masonry, wood or steel structure within building.

3.5 FIELD QUALITY CONTROL

- A. Inspection of work
 1. Working parts shall be readily accessible for inspection, repair and renewal. The right is reserved to make reasonable changes in equipment location shown on Drawings prior to rough in without additional costs to the City.

2. During construction all work will be subject to observation by the Engineer and his representatives. Assist in ascertaining any information that maybe required.
 3. Do not allow or cause any work installed hereunder to be covered up or enclosed before it has been inspected and approved. Should any work be enclosed or covered prior to approval, uncover work, and after it has been inspected and approved, restore work of all others to the condition in which it was found at the time of cutting, all without additional costs to City.
- B. Furnish all testing equipment as maybe required.
- C. Test all wiring and connections for continuity and grounds; where such tests indicate faulty insulation or other defects, locate, repair and re-test.
- D. Check rotation of all motors and correct if necessary.

3.6 CLEANING

- A. Repair or replace all broken, damaged or otherwise defective parts without additional cost to City, and leave entire work in a condition satisfactory to Engineer. At completion, carefully clean and adjust all equipment, fixtures and trim installed as part of this work; leave systems and equipment in satisfactory operating condition.
- B. Clean out and remove from the site all surplus materials and debris resulting from this work; this includes surplus excavated materials.

3.7 DEMONSTRATION

- A. At project completion, Contractor shall allot a period of not less than 8 hours for instruction of operating and maintenance personnel in the use of all systems installed under this Division. This time is in addition to any instruction time stated in the Specifications of other sections for other equipment (i.e., fire alarm, security, intercom, etc.). All personnel shall be instructed at one time, the Contractor shall make all necessary arrangements with manufacturer's representatives as may be required. Contractor, if any, for the above services shall pay all costs.

3.8 PROTECTION

- A. In performance of work, protect work of other trades as well as work under this Division from damage.
- B. Protect electrical equipment, stored and installed, from dust, water or other damage.

END OF SECTION 26 05 00

SECTION 260519 - CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 -SUMMARY7-

- A. Section includes
 - 1. Provide all labor, materials and equipment necessary for the installation of all conductors and cables under this Section related to lighting, power, mechanical, control and signal systems.
- B. Related sections
 - 1. Where items specified in other Division 26 sections conflict with the requirements of this Section, the most stringent requirement shall govern.
 - 2. The requirements of this Section apply to all Division 26 work, as applicable.
 - 3. Consult all other sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.

1.2 REFERENCES

- A. Comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified:
 - 1. ASTM -American Society for Testing and Materials
 - a. B3; Standard Specification for Soft or Annealed Copper Wire
 - b. B8; Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
 - c. B787/B787M; Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation
 - d. D1000; Standard Test Method for Pressure-Sensitive Adhesive-Coated Tapes Used for Electrical and Electronic Applications
 - 2. CCR –California Code of Regulations, Title 24
 - a. Part 3 -California Electrical Code(CEC); NFPA 70 National Electrical Code (NEC) with California amendments
 - 3. UL -Underwriters Laboratories, Inc.
 - a. UL 83; Thermoplastic-Insulated Wire and Cables
 - b. UL 486A 486B; Wire Connectors
 - c. UL 486C; Splicing Wire Connectors
 - d. UL 486D; Standard for Insulated Wire Connector Systems For Underground Use Or In Damp Or Wet Locations

- e. UL 486E; Standard for Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors
 - f. UL 493; Thermoplastic-Insulated Underground Feeders and Branch Circuit Cables
 - g. UL 510; Standard for Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape
 - h. UL 854; Service-Entrance Cables
- 4. NEMA –National Electrical Manufacturer’s Association
 - a. WC 70-1999; Nonshielded Power Cables Rated 2000 Volts or less for the Distribution of Electrical Energy
 - 5. IEEE –Institute of Electrical and Electronic Engineers
 - a. 82; Standard Test Procedure for Impulse Voltage Tests on Insulated Conductors

1.3 DELIVERY

- A. Wire shall be in original unbroken package. Obtain approval of Inspector or Engineer before installation of wires.

PART 2 - PRODUCTS

2.1 BUILDING WIRE

- A. Conductor material
 - 1. Provide annealed copper for all wire, conductor and cable of not less than 98% conductivity.
 - 2. Wire #8 AWG and larger shall be stranded.
 - 3. Wire #10 AWG and smaller shall be solid.
- B. Insulation material
 - 1. All insulated wire, conductor and cable shall be 600 Vac rated.
 - 2. Feeder and branch circuits larger than #6 AWG shall be type THW, XHHW or THHN/THWN.
 - 3. Feeder and branch circuits #6 AWG and smaller shall be type TW, THW, XHHW or THHN/THWN.
 - 4. Control circuits shall be type THW or THHN/THWN.
 - 5. Wires shall bear the UL label, be color-coded and marked with gauge, type and manufacturer’s name on 24” centers.

2.2 FLEXIBLE CORDS AND CABLES

- A. Provide flexible cords and cables of size, type and arrangement as indicated on Drawings.
- B. Type S flexible cords and cable shall be manufactured in accordance with CEC Article 400 and composed of two or more conductors and a full sized green insulated grounding conductor with an outer rubber or neoprene jacket.
- C. Flexible cords and cables shall be fitted with wire mesh strain relief grips either as a integral connector component or an independently supported unit.
- D. Suspended flexible cords and cables shall incorporate safety spring(s).

2.3 WIRE CONNECTIONS AND TERMINATIONS

- A. Electrical spring wire connectors
 - 1. Provide multi-part construction incorporating a non-restricted, zinc coated square cross-sectional steel spring enclosed in a steel sheet with an outer jacket of plastic and insulating skirt.
 - 2. Self-striping pigtail and tap U-contact connectors are not acceptable.
- B. Compression type terminating lugs
 - 1. Provide tin-plated copper high compression type lugs for installation with hand or hydraulic crimping tools as directed by manufacturer. Notch or single point type crimps are not acceptable.
 - 2. Two hole, long barrel lugs shall be provided for size #4/O AWG and larger wire where terminated to bus bars. Use minimum of three crimps per lug where possible.
- C. Splicing and insulating tape
 - 1. Provide black, UV resistant, self extinguishing, 7 mil thick vinyl general purpose electrical tape per UL 510 and ASTM D1000. 3M Scotch 33 or equal.
- D. Insulating putty
 - 1. Provide pads or rolls of non-corrosive, self-fusing, 125 mil thick rubber putty with PVC backing sheet per UL 510 and ASTM D1000. 3M Scotchfil or equal.
- E. Insulating resin
 - 1. Provide two-part liquid epoxy resin with resin and catalyst in pre-measured, sealed mixing pouch. 3M Scotchcast 4 or equal.
 - 2. Use resin with thermal and dielectric properties equal to the cable's insulating properties.
- F. Terminal strips

1. Provide box type terminal strips in the required quantities plus 25% spare. Install in continuous rows.
 2. Use the box type terminal strips with barrier open backs and with ampere ratings as required.
 3. Identify all terminals strips and circuits.
- G. Crimp type connectors
1. Provide insulated fork or ring crimp terminals with tinned electrolytic copper-brazed barrel with funnel wire entry and insulation support.
 2. Fasten crimp type connectors or terminals using a crimping tool recommended by the manufacturer.
 3. Provide insulated overlap splices with tinned seamless electrolytic copper-brazed barrel with funnel wire entry and insulation support.
 4. Provide insulated butt splices with tinned seamless electrolytic copper-brazed barrel with center stop, funnel wire entry and insulation support.
- H. Cable ties
1. Provide harnessing and point-to-point wire bundling with nylon cable ties. Install using tool supplied by manufacturer as required.
- I. Wire lubricating compound
1. UL listed for the wire insulation and conduit type, and shall not harden or become adhesive.
 2. Shall not be used on wire for isolated type electrical power systems.
- J. Bolt termination hardware
1. Bolts shall be plated, medium carbon steel heat-treated, quenched and tempered equal to ASTM A-325 or SAE Grade 5; or silicon bronze alloy ASTM B-9954 Type B.
 2. Nuts shall be heavy semi-finished hexagon, conforming to ANSI B18.2.2, threads to be unified coarse series (UNC), class 2B steel or silicon bronze alloy.
 3. Flat washers shall be steel or silicon bronze, Type A plain standard wide series, conforming to ANSI B27.2. SAE or narrow series shall be used.
 4. Belleville conical spring washers shall be hardened steel, cadmium plated or silicon bronze.
 5. Each bolt connecting lug(s) to a terminal or bus shall not carry current exceeding the following values:
 - a. 1/4" bolt – 125 A
 - b. 5/16" bolt – 175 A
 - c. 3/8" bolt – 225 A

- d. 1/2" bolt – 300 A
- e. 5/8" bolt – 375 A
- f. 3/4" bolt – 450 A

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Thoroughly examine site conditions for acceptance of wire and cable installation to verify conformance with manufacturer and specification tolerances. Do not commence with work until all conditions are made satisfactory.

3.2 INSTALLATION

- A. All wire, conductor, and cable with their respective connectors, fittings and supports shall be UL listed for the installed application and ambient conditions.
- B. Feeders and branch circuits in wet locations shall be rated 75°C minimum.
- C. Feeders and branch circuits in dry locations shall be rated 90°C minimum.
- D. Minimum conductor size
 - 1. #12 AWG copper for all power and lighting branch circuits.
 - 2. #14 AWG copper for all line voltage signal and control wiring, unless otherwise indicated.
 - 3. Aluminum conductors may be substituted on the basis of equal performance for sizes greater than #10 AWG with the approval of Engineer.
- E. Remove and replace conductors under the following conditions at no additional costs to the City:
 - 1. Installed within wrong specified conduit or raceway.
 - 2. Damaged during installation.
 - 3. Of insufficient length to facilitate proper splice of conductors

3.3 WIRING METHODS

- A. Install wires and cable in accordance with manufacturer's written instructions, as shown on Drawings and as specified herein.
- B. Install all single conductors within raceway system, unless otherwise indicated.

- C. Parallel circuit conductors and terminations shall be equal in length and identical in all aspects.
- D. Provide adequate length of conductors within electrical enclosures and neatly train to termination points with no excess. Terminate such that there is no bare conductor at the terminal.
- E. Splice cables and wires only in junction boxes, outlet boxes, pull boxes, manholes or handholes.
- F. Group and bundle with tie wrap each neutral with its associated phase conductors where more than one neutral conductor is present within a conduit.
- G. Install cable supports for all vertical feeders in accordance with CEC Article 300. Provide split wedge type fittings, which firmly clamp each individual cable and tighten due to cable weight.
- H. Seal cable where exiting a conduit from an exterior underground raceway with a non-hardening compound (i.e., duct seal or equal).
- I. Provide UL listed factory fabricated, solder-less metal connectors of size, ampacity rating, material, type and class for applications and for services indicated. Use connectors with temperature ratings equal or greater than the conductor or cable being terminated.
- J. Stranded wire shall be terminated using fittings, lugs or devices listed for the application. Under no circumstances shall stranded wire be terminated solely by wrapping it around a screw or bolt.
- K. Flexible cords and cables supplied as part of a pre-manufactured assembly shall be installed according to manufacturer's published instructions.

3.4 WIRING INSTALLATION IN RACEWAYS

- A. Install wire in raceway after interior of building has been physically protected from weather, and all mechanical work likely to injure conductors has been completed.
- B. Pull all conductors into raceway at the same time.
- C. Use UL listed, non-petroleum base and insulating type pulling compound as needed.
- D. Completely mandrel all underground or concrete encased conduits prior to installation.
- E. Completely and thoroughly swab raceway system prior to installation
- F. Do not use block and tackle, power driven winch or other mechanical means for pulling conductors smaller than #1 AWG.
- G. Wire pulling

1. Provide installation equipment that will prevent cutting or abrasion of insulation during installation.
2. Maximum pull tension shall not exceed manufacturer's recommended value during installation for cable being measured with tension dynamometer.
3. Use rope made of non-metallic material for pulling.
4. Attach pulling lines by means of either woven basket grips or pulling eyes attached directly to the conductors.
5. Pull multiple conductors simultaneously within same conduit.

3.5 WIRE SPLICES, JOINTS AND TERMINATIONS

- A. Join and terminate wire, conductors and cables in accordance with UL 486, CEC and manufacturer's instructions.
- B. Thoroughly clean wires before installing lugs and connectors.
- C. Make splices, taps and terminations to carry full conductor ampacity without perceptible temperature rise, and shall be made mechanically and electrically secure.
- D. Terminate wires in terminal cabinets using terminal strips, unless otherwise indicated.
- E. Insulate spare conductors with electrical tape and leave sufficient length to terminate anywhere within panel or cabinet.
- F. Encapsulate splices in wet locations using specified insulating resin kits.
- G. Make up all splices and taps in accessible junction or outlet boxes with connectors as specified herein. Pigtails and taps shall be the same color as feed conductor with at least 6 inches of tail, all neatly packed within box.
- H. Where conductors are to be connected to metallic surfaces, coated surfaces shall be cleaned to base metal surface before installing connector. Remove lacquer coating of conduits where ground clamps are to be installed.
- I. Branch circuits (#10 AWG and smaller) connectors shall comply with 2.01.D.2 and 2.01.D.2 above.
- J. Branch circuits (#8 AWG and larger)
 1. Join or tap conductors using insulated mechanical compression taps with pre-molded, snap-on insulating boots or specified conformable insulating pad and over-wrapped with two half-lapped layers of vinyl insulating tape starting and ending at the middle of joint.
 2. Terminate conductors using mechanical compression lugs in accordance with manufacturer's recommendation or as specified elsewhere.

3. Field installed compression connectors for 250 MCM and larger shall have not less than two clamping elements or compression indents per wire.
 4. Insulate splices and joints with materials approved for the particular use, location, voltage and temperature.
- K. Termination hardware assemblies
1. Al/Cu lugs connected to aluminum plated or copper bus shall be secured with steel bolt, flat washer (two per bolt), Belleville washer and nut.
 2. Copper lugs connected to copper buss shall bus shall be secured using silicon bronze alloy bolt, flat washer (two per bolt), Belleville washer and nut.
 3. The crown of Belleville washers shall be under the nut.
 4. Bolt assemblies shall be torque to manufacturer's recommendations. Where manufacturer recommendation is not obtainable, the following shall be used:
 - a. 1/4" -20 bolt at 80 inch-pound torque
 - b. 5/16" -18 bolt at 180 inch-pound torque
 - c. 3/8" -20 bolt at 20 inch-pound torque
 - d. 1/2" -20 bolt at 40 inch-pound torque
 - e. 5/8" -20 bolt at 55 inch-pound torque
 - f. 3/4" -20 bolt at 158 inch-pound torque

3.6 IDENTIFICATION

- A. Securely tag all branch circuits. Mark conductors with specified vinyl wrap-around markers. Where more than two conductors run through a single outlet, mark each conductor with the corresponding circuit number.
- B. Provide all terminal strips with each individual terminal identified using specified vinyl markers.
- C. In manholes, pullboxes and handholes provide tags of embossed brass type with cable type and voltage rating. Attach tags to cable with slip-free plastic cable lacing units.
- D. Color coding
 1. For 120/208 Volt (or 120/240 Volt), 1 phase, 3 wire systems:
 - a. Phase A – Black
 - b. Phase B – Red
 - c. Neutral – White
 - d. Ground – Green
 2. For 120/208 Volt, 3 phase, 4 wire systems:
 - a. Phase A – Black
 - b. Phase B – Red

- c. Phase C – Blue
- d. Neutral – White
- e. Ground – Green

3. For 277/480 Volt, 3 phase, 4 wire systems:

- a. Phase A – Brown
 - b. Phase B – Orange
 - c. Phase C – Yellow
 - d. Neutral – Gray
 - e. Ground – Green
4. Switch leg individually installed shall be the same color as the branch circuit to which they originate, unless otherwise indicated.
5. Travelers for 3-way and 4-way switches shall be a distinct color and pulled with the circuit switch leg or neutral.

3.7 FIELD QUALITY CONTROL

- A. Supply labor, materials and test equipment required to perform continuity and ground tests.
- B. Electrical testing
- 1. Perform feeder and branch circuit insulation test after installation and prior to connection to device.
 - 2. Tests shall be performed by 600 Vdc megger for a continuous 10 seconds from phase-to-phase and phase-to-ground.
 - 3. Torque test conductor connections and terminations for conformance to Specifications.
 - 4. If any failure is detected, locate failure, determine cause and replace or repair cable to Engineer's satisfaction at no additional costs.
 - 5. Furnish test results in type written report form for review by Engineer.

END OF SECTION 26 05 19

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes
 - 1. Provide all labor, materials and equipment necessary to complete the installation required for the item specified under this Section, including but not limited to power system grounding
- B. Related sections
 - 1. Where items specified in other Division 26 sections conflict with the requirements of this Section, the most stringent requirement shall govern.
 - 2. The requirements of this Section apply to all Division 26 work, as applicable.
 - 3. Consult all other sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.

1.2 REFERENCES

- A. Comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified:
 - 1. CCR –California Code of Regulations, Title 24
 - a. Part 3 -California Electrical Code (CEC); NFPA 70 National Electrical Code (NEC) with California amendments
 - 2. IEEE –Institute of Electrical and Electronic Engineers
 - a. 142; Recommend Practices for Grounding of Industrial and Commercial Power Systems
 - 3. NFPA –National Fire Protection Association
 - a. 780; Lightning Protection Code
 - 4. UL –Underwriters Laboratories, Inc.
 - a. 467; Grounding and Bonding Equipment

1.3 SYSTEM DESCRIPTION

- A. This Section provides for the grounding and bonding of all electrical and communication apparatus, machinery, appliances, components, fittings and

accessories where required to provide a permanent, continuous, low impedance, grounded electrical system.

- B. Ground the electrical service system neutral at service entrance equipment as shown on the Drawings.
- C. Ground each separately derived system, as defined in CEC 250.5 (D) and on the Drawings, unless specifically noted otherwise.
- D. Except as otherwise indicated, the complete electrical installation including the neutral conductor, equipment and metallic raceways, boxes and cabinets shall be completely and effectively grounded in accordance with all CEC requirements, whether or not such connections are specifically shown or specified.

1.4 SUBMITTALS

- A. Submit manufacturer's data for equipment and materials specified within this Section in accordance to Section 16050.

1.5 QUALITY ASSURANCE

- A. All materials, equipment and parts comprising the materials specified herein shall be new and unused, bearing UL labels where applicable.

PART 2 - PRODUCTS

2.1 CONCRETE ENCASED GROUNDING ELECTRODE (UFER GROUND)

- A. #3/O AWG minimum bare stranded copper conductor.

2.2 DRIVEN (GROUND) RODS

- A. Copper clad steel, minimum $\frac{3}{4}$ " diameter by 10'-0" length, sectional type with copper alloy couplings and carbon steel driving stud; Weaver, Cadweld or equal.

2.3 INSULATED GROUNDING BUSHINGS

- A. Plated malleable iron body with 150°C molded plastic insulated throat and lay-in ground lug; OZ/Gedney BLG, Thomas & Betts #TIGB series or equal.

2.4 CONNECTION TO PIPE

- A. Cable to pipe connections; OZ/Gedney G-100B series, Thomas & Betts #290X series or equal.

2.5 CONNECTIONS TO STRUCTURAL STEEL, GROUND RODS OR SPICES

- A. Where required by the Drawings, grounding conductors shall be spliced together, connected to ground rods or connected to structural steel using exothermic welds, Cadweld or equal, or high pressure compression type connectors, Cadweld, Thomas & Betts or equal.

2.6 BONDING JUMPERS

- A. OZ/Gedney Type BJ, Thomas & Betts #3840 series or equal.

2.7 GROUND CONDUCTOR

- A. Ground conductor shall be code size UL labeled, Type THWN insulated copper wire, green in color.

PART 3 -EXECUTION

3.1 INSTALLATION

- A. Grounding electrodes
 - 1. Concrete encased grounding electrode (Ufer ground)
 - a. Provide a #3/O AWG minimum bare copper conductor encased along the bottom of concrete foundation, footing or trench which is in direct contact with the earth and where there is no impervious waterproofing membrane between the footing and soil. The electrode shall extend through a horizontal length of 30' minimum and shall be encased in not less than 2" or more than 5" of concrete separating it from surrounding soil. The electrode shall emerge from the concrete slab through a protective non-metallic sleeve and shall be extended to BGB or as shown on Drawings.
 - 2. Supplementary grounding electrode (ground ring, grid and driven rod)
 - a. Provide as shown driven ground rod(s). Interconnect ground rod with structural steel and adjacent rods with code size bare copper conductor. Ground rods shall be space no less than 6'-0" on centers from any other electrode or electrodes of another electrical system.
- B. Grounding electrode conductor
 - 1. Provide grounding electrode conductors per CEC Table 250-94 or as shown on Drawings, whichever is greater.
- C. Equipment Bonding/Grounding
 - 1. Provide a code sized copper ground conductor, whether indicated or noted on the drawings, in each of the following:

- a. All power distribution conduits and ducts
 - b. Distribution feeders
 - c. Motor and equipment branch circuits
 - d. Device branch circuits
2. Provide a separate grounding bus at distribution panelboards, loadcenters, switchboards and motor control centers. Connect all metallic enclosed equipment so that with maximum fault current flowing, shall be maintained at not more than 35V above ground.
 3. Metallic conduits terminating in concentric, eccentric or oversized knockouts at panelboards, cabinets, gutters, etc. shall have grounding bushings and bonding jumpers installed interconnecting all such conduits.
 4. Provide bonding jumpers across expansion and deflection coupling in conduit runs, pipe connections to water meters and metallic cold water dielectric couplings.
 5. Provide ground wire in flexible conduit connected at each end via grounding bushing.
 6. Provide bonding jumpers across all cable tray joints.
 7. Bond each end of metallic conduit longer than 36" in length to grounding conductor using a #6 AWG pigtail.

3.2 FIELD QUALITY CONTROL

- A. Contractor using test equipment expressly designed for that purpose shall perform all ground resistance tests in conformance with IEEE guidelines. Contractor shall submit typewritten records of measured resistance values to City for review and approval prior to energizing the system.
- B. Obtain and record ground resistance measurements both from electrical equipment ground bus to the ground electrode and from the ground electrode to earth. Furnish and install additional bonding and add grounding electrodes as required to comply with the following resistance limits:
 1. Resistance from ground bus to ground electrode and to earth shall not exceed 5 ohms unless otherwise noted.
 2. Resistance from the farthest panelboard, loadcenter, switchboard or motor control center ground bus to the ground electrode and to earth shall not exceed 20 ohms maximum.
- C. Inspection
 1. The City or Inspector prior to encasement, burial or concealment thereto shall review the grounding electrode and connections.

END OF SECTION 26 05 26

SECTION 260533 - RACEWAYS AND BOXES

PART 1 -GENERAL

1.1 SUMMARY

A. Section includes:

1. Provide all labor, materials and equipment necessary to complete the installation required for the items specified under this Section, including but not limited to electrical conduits; outlet, junction and pull boxes; and related supports.

B. Related sections:

1. Where items specified in other Division 26 sections conflict with the requirements of this Section, the most stringent requirement shall govern.
 - a. 260526 – Grounding and Bonding for Electrical Systems
2. The requirements of this Section apply to all Division 26 work, as applicable.
3. Consult all other sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.

1.2 REFERENCES

A. Comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified:

1. ANSI –American National Standards Institute
 - a. C33.91; Specification for Rigid PVC Conduit
 - b. C80.1; Specification Rigid Steel Conduit, Zinc-Coated
 - c. C80.3; Specification for Electrical Metallic Tubing, Zinc-Coated
 - d. C80.6; Intermediate Metal Conduit (IMC), Zinc-Coated
2. CCR –California Code of Regulations, Title 24
 - a. Part 2 -California Building Code (CBC); International Building Code (IBC) with California amendments
 - b. Part 3 -California Electrical Code(CEC); NFPA 70 National Electrical Code (NEC) with California amendments
3. NECA –National Electrical Contractors Association
 - a. 101, Standard for Installing Steel Conduit (Rigid, IMC, EMT)
 - b. 111, Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC) (ANSI)

4. NEMA –National Electrical Manufacturer’s Association
 - a. FB 1; Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable
 - b. FB 2.10; Selection and Installation Guidelines for Fittings for Use with Non-flexible Electrical Metal Conduit or Tubing (Rigid Metal Conduit, Intermediate Metal Conduit, and Electrical Metallic Tubing)
 - c. FB 2.20; Selection and Installation Guidelines For Fittings for Use With Flexible Electrical Conduit and Cable
 - d. OS 1; Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports
 - e. OS 3; Selection and Installation Guidelines for Electrical Outlet Boxes
 - f. RN 1; Polyvinyl-Chloride Externally Coated Galvanized Rigid Steel Conduit and Electrical Metallic Tubing
 - g. TC 2; Electrical Plastic Tubing and Conduit
 - h. TC 3; PVC Fittings for Use with Rigid PVC Conduit and Tubing
 - i. TC 14; Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
5. OSHPD Anchorage Pre-approvals
 - a. OPA-0003; Superstrut Seismic Restraint System
 - b. OPA-0114; B-Line Seismic Restraints
 - c. OPA-0120; Unistrut Seismic Bracing System
 - d. OPA-0242; Power-Strut Seismic Bracing System
6. UL –Underwriter’s Laboratories, Inc.
 - a. 1; Standard for Flexible Metal Conduit
 - b. 6; Rigid Metal Electrical Conduit
 - c. 360; Standard for Liquid-Tight Flexible Steel Conduit
 - d. 514A; Metallic Outlet Boxes, Electrical
 - e. 514B; Fittings for Conduit and Outlet Boxes
 - f. 651; Schedule 40 & 80 PVC Conduit
 - g. 797; Electrical Metallic Tubing
 - h. 1242; Intermediate Metal Conduit
 - i. 1684; Reinforced Thermosetting Resin Conduit (RTRC) and Fittings

1.3 SYSTEM DESCRIPTION

- A. Furnish, assemble, erect, install, connect and test all electrical conduits and related raceway apparatus required and specified to form a complete installation.

1.4 SUBMITTALS

- A. Submit manufacturer’s data for materials specified within this Section in accordance to Section 16050.

1.5 QUALITY ASSURANCE

- A. All materials, equipment and parts comprising the materials specified herein shall be new and unused, bearing UL labels where applicable.
- B. Installation shall conform to the NECA installation guidelines unless otherwise indicated within this Section

PART 2 - PRODUCTS

2.1 MATERIALS

A. Conduits and Fittings

1. Rigid steel conduit (RMC)

- a. Conduit: Standard weight, mild steel pipe, and zinc coated on both inside and outside by a hot dipping or shearardizing process manufactured in accordance with UL 6 and ANSI C80.1 specifications.
- b. Fittings (couplings, elbows, bends, etc.):
 - 1) Shall be steel or malleable iron.
 - 2) Coupling and unions shall be threaded type, assembled with anti-corrosion, conductive and anti-seize compound at joints made absolutely tight to exclude water.
- c. Bushings:
 - 1) Insulating bushings: Threaded polypropylene or thermosetting phenolic rated at 150°C minimum.
 - 2) Insulating grounding bushing: Threaded cast body with insulating throat and steel "lay-in" ground lug.
 - 3) Insulating metallic bushing: Threaded cast body with plastic insulated throat rated at 150°C minimum.

2. Coated rigid steel conduit (CRMC)

- a. Conduit: Equivalent to RMC with a Polyvinyl chloride (PVC) coated bonded to the galvanized outer surface of the conduit. The bonding between the PVC coating and conduit surface shall be ETL PVC-001 compliant. The coating thickness shall be a minimum of 40mil.
- b. Fittings (couplings, elbows, bends, etc.)
- c. Equivalent to RMC above with bonded coating same as conduit.
- d. The PVC sleeve over fittings shall extend beyond hub or coupling approximately one diameter or 1 1/2" whichever is smaller.
- e. Bushing equivalent to RMC above.

3. Intermediate metallic conduit(IMC)

- a. Conduit: Intermediate weight, mild steel pipe, meeting the same requirements for finish and material as rigid steel conduit manufactured in accordance with UL 1242 and ANSI C80.6 specifications.
- b. Fittings (couplings, elbows, bends, etc.) equivalent to RMC above.

- c. Bushing equivalent to RMC above.
- 4. Electrical metallic tubing (EMT)
 - a. Conduit: Cold rolled steel tubing with zinc coating on outside and protective enamel on inside manufactured in accordance with UL 797 and ANSI C80.3 specifications.
 - b. Couplings: Steel or malleable iron with compression type fastener via a nut.
 - c. Connectors: Steel or malleable iron with compression type fastener via a nut with plastic insulated throat rated at 150°C minimum.
- 5. Rigid non-metallic conduit (PVC)
 - a. Conduit: PVC composed Schedule 40, 90°C manufactured in accordance with NEMA TC 2 and UL 651 specifications.
 - b. Fittings: Molded PVC, slip on solvent welded type in accordance to NEMA TC 3.
- 6. Reinforced thermosetting resin conduit (RTRC)
 - a. Conduit: Fiber impregnated with a cured thermosetting resin compound in accordance with NEMA TC 14 and UL1684.
 - b. Fittings: Molded resin with glass reinforcement manufactured in the same process as the conduit bonded with an epoxy adhesive.
- 7. Flexible metallic conduit (FMC)
 - a. Conduit: Continuous, flexible steel spirally wound with zinc coating on both inside and outside in accordance with UL 1.
 - b. Connectors: Steel or malleable iron with compression type fastener via a nut with plastic insulated throat rated at 150°C minimum.
- 8. Liquidtight flexible metallic conduit (LFMC)
 - a. Conduit: PVC coated, continuous, flexible steel spirally wound with zinc coating on both inside and outside in accordance with UL 360.
 - b. Connectors: Steel or malleable iron with compression type fastener via a nut with plastic insulated throat rated at 150°C minimum.
- 9. Miscellaneous Fittings and Products
 - a. Conduit sealing bushings: Steel or cast malleable iron body and pressure clamps with PVC sleeve, neoprene sealing grommets and PVC coated steel pressure rings. Supplied with neoprene sealing rings between body and PVC sleeve.
 - b. Watertight cable terminators: One piece, compression molded sealing ring with PVC coated steel pressure disks, stainless steel screws and zinc plated cast iron locking collar.
 - c. Watertight cable/cord connectors: Liquidtight steel or cast malleable iron body with sealing neoprene bushing and stainless steel retaining ring.

- d. Expansion fittings: Multi-piece unit of hot dip galvanized malleable iron or steel body and outside pressure bussing design to allow a maximum of 4" movement (2" in either direction). Furnish with external braid tinned copper bonding jumper. UL listed for both wet and dry locations.
- e. Expansion/deflection couplings: Multi-piece unit comprised of a neoprene sleeve, internal flexible tinned copper braid attached to bronze end couplings with stainless steel bands. Coupling to provide minimum of 3/4" movement and 30 degrees deflection from normal. UL listed for both wet and dry locations.
- f. Conduit bodies: Raintight, malleable iron, hot-dip galvanized body with threaded hubs, stamped steel cover, stainless steel screws and neoprene gasket.
- g. Other couplings, connectors and fittings shall be equal in quality, material and construction to items specified herein.

B. Boxes:**1. Outlet boxes**

- a. Standard: Galvanized one-piece of welded pressed steel type in accordance with NEMA OS 1 and UL 514. Boxes shall not be less than 4" square and at least 1 1/2" deep.
- b. Concrete: Galvanized steel, 4" octagon ring with mounting lug, backplate and adapter ring type in accordance with NEMA OS 1 and UL 514. Depth as required by application.
- c. Masonry: Galvanized steel, 3.75" high gang box in accordance with NEMA OS 1 and UL 514.
- d. Surface cast metal: Cast malleable iron body, surface mounted box with threaded hubs and mounting lugs as required in accordance with NEMA OS 1 and UL 514. Furnish with ground flange, steel cover and neoprene gasket.

2. Pull and junction boxes

- a. Sheet metal boxes: Standard or concrete outlet box wherever possible; otherwise use 16 gauge galvanized sheet metal, NEMA 1 box sized per CEC with machine screwed cover.
- b. Cast metal boxes: Install standard cast malleable iron outlet or device box when possible.
- c. Flush mounted boxes: Install overlapping cover with flush head screws.
- d. In-ground mounted pull holes/boxes: Install pre-cast concrete box, sized per Drawing or CEC with pre-cast or traffic rated lid.

C. Pull line/cord:

- 1. Polypropylene braided line or Let-line #232 or equal of 1/8" diameter with a minimum break strength of 200 pounds.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Thoroughly examine site conditions for acceptance of wire and cable installation to verify conformance with manufacturer and specification tolerances. Do not commence with work until all conditions are made satisfactory.

3.2 PREPARATION

A. Conduit

1. Provide all necessary conduit fittings, connectors, bushings, etc. required to complete conduit installation to meet the CEC and intended application whether noted, shown or specified within.
2. Location of conduit runs shall be planned in advance of the installation and coordinated with other trades.
3. Where practical, install conduits in groups in parallel vertical or horizontal runs that avoid unnecessary offsets.
4. All conduits shall be parallel or at right angles to columns, beams and walls whether exposed or concealed.
5. Conduits shall not be placed closer than 12" to a flue, parallel to hot water, steam line or other heat sources; or 3" when crossing perpendicular to the above said lines when possible.
6. Install exposed conduit as high as practical to maintain adequate headroom. Notify City if headroom will be less than 102".
7. Do not obstruct spaces required by Code in front of electrical equipment, access doors, etc.
8. The largest trade size conduit in concrete floors and walls shall not exceed 1/3 thickness or be spaced a less than three conduit diameters apart unless permitted by City. All conduits shall be installed in the center of slab or wall, and never between reinforcing steel and bottom of floor slab.
9. Install additional pull boxes, not shown on Drawings, in sufficient quantities to facilitate pulling of conductors and cables such that total spacing does not exceed 150 feet or 270 degrees, total; and maximum pulling tension will not be exceeded.
10. When installing underground conduits to specified depth; depth shall be taken from finished grade as it will be at project completion. Should finish grade be above existing grade by an amount equal to or greater than specified depth, conduit shall be installed not less than 6" below existing grade.
11. Verify that information concerning finish grade is accurate, for should the underground run be less than the specified depth, Contractor may be required to re-install conduit to meet the required depth.

12. Unless otherwise specified, underground conduits shall be installed with top side not less than 24" below finished grade; this depth applies to all conduits outside of building foundations including those under walks, open corridors or paved areas.
13. Utility company service conduits installation depth shall be as directed by their respective specifications and requirements.

B. Boxes

1. Before locating outlet boxes, check Construction Documents for type of construction and make sure that there is no conflict with other equipment. Locate outlet boxes as shown and locate so as not to interfere with other Work or equipment.

3.3 INSTALLATION

A. Conduit

1. Minimum conduit size shall be 3/4" unless otherwise indicated.
2. All conduit work shall be concealed unless otherwise indicated. Exposed conduits shall be permitted within unfinished rooms/spaces to facilitate installation.
3. Install conduit in complete runs prior to installing conductors or cables.
4. Make long radius conduits bends free from kink, indentations or flattened surfaces. Make bends carefully to avoid injury or flattening. Bends 1 1/4" size and larger shall be factory made ells, or be made with a manufactured mechanical bender. Heating of steel conduit to facilitate bending or that damage galvanized coating will not be permitted.
5. Remove burrs and sharp edges at end of conduit with tapered reamer.
6. Protect and cover conduits during construction with metallic bushings and bushing "pennies" to seal exposed openings.
7. Assemble conduit threads with anti-corrosion, conductive, anti-seize compound and tighten securely.
8. Install conduits shall that no traps to collect condensation exist.
9. Fasten conduit securely to boxes with locknuts and bushings to provide good grounding continuity.
10. Install pull cords/line within any spare or unused conduits of sufficient length to facilitate future cable installation.
11. Penetrations:

- a. Locate penetrations within structural members as shown on Drawings and as directed by City. Should it be necessary to notch any framing member, make such notching only at locations and in a manner as approved by City.
- b. Do not chase concrete or masonry to install conduit unless specifically approved by City.
- c. Cutting or holes
- d. Install sleeves for cast-in-place concrete floors and walls. After installing conduit through penetration, seal using dry-pack grouting compound (non-iron bearing, chloride free and non-shrinking) or fire rated assembly if rated floor or wall. Use escutcheon plate on floor underside to contain compound as necessary.
- e. Cut holes with a hole saw for penetrations through non-concrete or non-masonry members.
- f. Provide chrome plated escutcheon plates at all publicly exposed wall, ceiling and floor penetrations.
- g. Sealing
 - 1) Non-rated penetration openings shall be packed with non-flammable insulating material and sealed with gypsum wallboard taping compound.
 - 2) Fire rated penetration shall be sealed using a UL classified fire stop assembly suitable to maintain the equivalent fire rating prior to the penetration.
 - 3) Use escutcheon plates to hold sealing or fire rated compound as necessary.
- h. Waterproofing:
 - 1) Make penetrations through any damp-proofed/waterproofed surfaces within damp/wet locations as such as to maintain integrity of surface.
 - 2) Install specified watertight conduit entrance seals at all below grade wall and floor penetrations.
 - 3) At roof penetrations furnish roof flashing, counter flashing and pitch-pockets compatible to roof assembly.
 - 4) Where possible conduits that horizontally penetrate a waterproof membrane shall fall away from and below the penetration's exterior side.
 - 5) Make penetrations through floors watertight with mastic, even when concealed within walls or furred spaces.

12. Supports:

- a. Conduits shall be support and braced per OSHPD pre-approved anchorage systems when those methods are implemented and installed.
- b. Sizes of rods and cross channels shall be capable of supporting 4 times and 5 times actual load, respectively. Anchorage shall support the combined weight of conduit, hanger and conductors.
- c. Support individual horizontal conduit 1 1/2" and smaller by means of 2 hole straps or individual hangers.
- d. Galvanized iron hanger rods sizes 1/4" diameter and larger with spring steel fasteners, clips or clamps specifically design for that purpose for 1 1/2" conduits and larger.
- e. Support multi-parallel horizontal conduits runs with trapeze type hangers consisting of 2 or more steel hanger rods, preformed cross channels, 'J' bolts, clamps, etc.

- f. Support conduit to wood structures by means of bolts or lag screws in shear, to concrete by means of insert or expansion bolts and to brickwork by means of expansion bolts.
 - g. Support multi-parallel vertical conduits runs with galvanized Unistrut, Power-Strut or approved equal type supports anchored to wall. Where multi-floored conduits pass through floors, install riser clamps at each floor.
 - h. Maximum conduit support spacing shall be in accordance with NECA Standard of Installation:
 - i. Horizontal runs:
 - 1) 3/4" and smaller at 60" on centers, unless building construction prohibits otherwise, then 84" on centers.
 - 2) 1" and larger at 72" on centers, unless building construction prohibits otherwise or any other condition, then 120" on centers.
 - j. Vertical runs:
 - 1) 3/4" and smaller @ 84" on centers.
 - 2) 1" and 1 1/4" @ 96" on centers.
 - 3) 1 1/2" and larger @ 120" on centers.
 - k. Any vertical condition such as shaftways and concealed locations for any sized conduit, 120" on centers.
 - l. Anchorage for RMC/IMC supports unless otherwise specified:
 - 1) < 1" IMC/RMC = #10 bolt/screw.
 - 2) 1" IMC/RMC = 1/4" bolt/screw.
 - 3) 1 1/2" and 2" IMC/RMC = 3/8" bolt/screw.
 - 4) 3" IMC/RMC, 4" EMT = 1/2" bolt/screw.
 - 5) > 3"IMC/RMC = 5/8" bolt/screw.
 - m. Anchorage for EMT supports unless otherwise specified:
 - 1) < 1 1/2" EMT = #10 bolt/screw.
 - 2) 1 1/2" EMT = 1/4" bolt/screw.
 - 3) 2, 2 1/2" and 3" EMT = 3/8" bolt/screw.
 - 4) 4" EMT = 1/2" bolt/screw.
 - 5) > 4"EMT = 5/8" bolt/screw.
- B. Boxes:
- 1. Install boxes as shown on Drawings and as required for splices, taps, wire pulling, equipment connections and Code compliance.
 - 2. Install additional pull boxes, not shown on Drawings, in sufficient quantities to facilitate pulling of conductors and cables such that total spacing does not exceed 150 feet or 270 degrees, total; and maximum pulling tension will not be exceeded.
 - 3. Install plaster rings on all outlet boxes in stud walls or in furred, suspended or exposed ceilings. Covers shall be of a depth suited for installation.
 - 4. Provide gasketed cast metal cover plates where boxes are exposed in damp or wet locations
 - 5. Install access door for boxes installed within concealed locations without access.
 - 6. Install approved factory made knockout seal where knockouts are not present.

7. Refer to Architectural interior elevations and details shown for exact mounting heights of all electrical outlets. In general, locate outlets as shown or specific and complies with Americans with Disabilities Act:
 - a. Convenience outlets: +18" AFF or +6" above counter or splash.
 - b. Local switches: +48" AFF or +6" above counter or splash.
 - c. Telecommunication outlets: +18" AFF or +48" AFF for wall telephone or intercom device.
 - d. Verify all mounting heights with Drawings, and where heights are not suited for construction or finish please consult City.
8. Use conduit bodies to facilitate pulling of conductor or cables or change conduit direction. Do not splice within conduit bodies.
9. Enclose pull box with additional rated gypsum board as necessary to maintain wall's original fire rating.
10. Install galvanized steel coverplates on all open boxes within dry listed areas.
11. Install in-ground pull holes/boxes flush to grade finish at finished areas or 1" above finished landscaped grade. Seal all conduits terminating in pull hole/box watertight. Install and grout around bell ends where shown. Cover and lids shall be removable without damage to adjacent finish surfaces.
12. Support
 - a. Accurately place boxes for finish, independently and securely supported by adequate blocking or manufacturer channel type heavy-duty box hangers for stud walls. Do not use nails to support boxes.
 - b. Support boxes independent of conduit system.
 - c. Mount boxes installed within ceilings to 16 gauge metal channel bars attached to main runners or joists.
 - d. Support boxes within suspended acoustical tile ceilings directly from structure above when light fixture are to be installed from box.
 - e. Use auxiliary plates, bar or clips and grouted in place for masonry, block or pour-in-place concrete construction.

3.4 APPLICATION

- A. Conduit:
 1. RMC/IMC suitable for all damp, dry and wet locations except when in contact with earth. IMC not suitable for hazardous locations as stated within CEC.
 2. CRMC suitable for damp or wet locations, concealed within concrete or in contact with earth.
 3. EMT suitable for exposed or concealed dry, interior locations.
 4. PVC/RTRC suitable for beneath ground floor slab, except when penetrating, and direct earth burial. Do not run exposed within concrete walls or in floor slab unless indicated on Drawings or per City's permission.

5. FMC suitable for dry locations only for connections to motors, transformers, vibrating equipment/machinery, controllers, valves, switches and light fixtures in less than 6 foot lengths.
 6. LFMC application same as FMC above but for damp or wet locations.
- B. Termination and joints:
1. Use raceway fittings compatible with associated raceway and suitable for the location.
 2. Raceways shall be joined using specified couplings or transitions where dissimilar raceway systems are joined.
 3. Conduits shall be securely fastened to cabinets, boxes and gutters using (2) two locknuts and insulating bushing or specified insulated connector. Where joints cannot be made tight and terminations are subject to vibration, use bonding jumpers, bonding bushings or wedges to provide electrical continuity of the raceway system. Use insulating bushings to protect conductors where subjected to vibration or dampness. Install grounding bushings or bonding jumpers on all conduits terminating at concentric or eccentric knockouts.
 4. Terminations exposed at weatherproof enclosures and cast outlet boxes shall be made watertight using specified connectors and hubs.
 5. Stub freestanding equipment conduits through concrete floors for connections with top of coupling set flush with finished floor. Install plugs to protect threads and entrance of debris.
 6. Install specified cable sealing bushings on all conduits originating outside the building walls and terminating within interior switchboard, panel, cabinet or gutters. Install cable sealing bushings or raceway seal for conduit terminations in all grade level or below grade exterior pull, junction or outlet boxes.
 7. Where conduits enter building from below grade inject into filled raceways pre-formulated rigid 2 lbs. density polyurethane foam suitable for sealing against water, moisture, insects and rodents.
 8. Install expansion fitting or expansion/deflection couplings per manufacturer's recommendations where:
 - a. Any conduit that crosses a building structure expansion joint; secure conduit on both sides to building structure and install expansion fitting at joint.
 - b. Any conduit that crosses a concrete expansion joint; install expansion/deflection at joint.
 - c. Any conduit greater than 1-1/4" is routed along roof top in runs greater than 100 feet; install expansion fittings every 100 feet.
 - d. City may allow FMC or LFMC in lieu of expansion fitting or expansion/deflection couplings on conduits 2" and smaller within accessible locations upon further review and written consent.

C. Boxes:

1. Standard type suitable for all flush installations and all dry concealed locations.
2. Concrete type suitable for all flush concrete installations.
3. Masonry type suitable for all flush concrete and block installations.
4. Surface cast meta type suitable for all exposed damp and wet surface mounted locations, and dry surface mounted locations less than 96" from finished floor.

END OF SECTION 26 05 33

SECTION 311000 - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Removing existing vegetation.
 - 2. Clearing and grubbing.
 - 3. Stripping and stockpiling topsoil.
 - 4. Stripping and stockpiling rock.
 - 5. Removing above- and below-grade site improvements.
 - 6. Disconnecting, capping or sealing, and removing site utilities.
 - 7. Temporary erosion and sedimentation control.
- B. Related Requirements:
 - 1. Section 015000 "Temporary Facilities and Controls" for temporary erosion- and sedimentation-control measures.

1.3 DEFINITIONS

- A. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.
- B. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil," but in disturbed areas such as urban environments, the surface soil can be subsoil.
- C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects larger than 2 inches in diameter; and free of weeds, roots, toxic materials, or other nonsoil materials.
- D. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.
- E. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 MATERIAL OWNERSHIP

- A. Except for materials indicated to be stockpiled or otherwise remain City's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.5 INFORMATIONAL SUBMITTALS

- A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.
 - 1. Use sufficiently detailed photographs or video recordings.
 - 2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plant designated to remain.
- B. Topsoil stripping and stockpiling program.
- C. Rock stockpiling program.
- D. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.
- E. Burning: Burning tree, shrub, and other vegetation waste is not permitted according to burning requirements and permitting authorities having jurisdiction. Burning of other waste and debris is prohibited.

1.6 QUALITY ASSURANCE

- A. Topsoil Stripping and Stockpiling Program: Prepare a written program to systematically demonstrate the ability of personnel to properly follow procedures and handle materials and equipment during the Work. Include dimensioned diagrams for placement and protection of stockpiles.
- B. Rock Stockpiling Program: Prepare a written program to systematically demonstrate the ability of personnel to properly follow procedures and handle materials and equipment during the Work. Include dimensioned diagrams for placement and protection of stockpiles.

1.7 FIELD CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from City and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed trafficways if required by City or authorities having jurisdiction.

- B. Salvageable Improvements: Carefully remove items indicated to be salvaged and store on City's premises as directed by City.
- C. Utility Locator Service: Notify 811 USA North for area where Project is located before site clearing.
- D. Do not commence site clearing operations until temporary erosion- and sedimentation-control and plant-protection measures are in place.
- E. Soil Stripping, Handling, and Stockpiling: Perform only when the soil is dry or slightly moist.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 312000 "Earth Moving."
 - 1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Protect existing site improvements to remain from damage during construction.
 - 1. Restore damaged improvements to their original condition, as acceptable to City and/or Landscape Architect.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.
- B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

- D. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.

3.3 EXISTING UTILITIES

- A. City will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing, when requested by Contractor.
 - 1. Verify that utilities have been disconnected and capped before proceeding with site clearing.
- B. Locate, identify, disconnect, and seal or cap utilities indicated to be removed.
 - 1. City will arrange to shut off indicated utilities when requested by Contractor.
- C. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by City or others, unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify City not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without City's written permission.
- D. Excavate for and remove underground utilities indicated to be removed.

3.4 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
 - 1. Remove all deleterious and herbaceous materials from the project area to a depth of 2" below existing grade.
 - 2. Grind down stumps and remove roots larger than 2 inches in diameter, obstructions, and debris to a depth of 24 inches below exposed subgrade.
 - 3. Chip removed tree branches and dispose of off-site.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
 - 1. Place fill material in horizontal layers not exceeding a loose depth of 6 inches, and compact each layer to a density equal to adjacent original ground.

3.5 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to depth in a manner to prevent intermingling with underlying subsoil or other waste materials.

1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects larger than 2 inches in diameter; trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil away from edge of excavations without intermixing with subsoil or other materials. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
 1. Limit height of topsoil stockpiles to 72 inches.
 2. Do not stockpile topsoil within protection zones.
 3. Dispose of surplus topsoil. Surplus topsoil is that which exceeds quantity indicated to be stockpiled or reused.
 4. Stockpile surplus topsoil to allow for respreading deeper topsoil.

3.6 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
 1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
 2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.

3.7 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off City's property.
- B. Burning tree, shrub, and other vegetation waste is not permitted according to burning requirements and permitting of authorities having jurisdiction. Burning of other waste and debris is prohibited.
- C. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials, and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION 311000

SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavating and filling for rough grading the Site.
2. Preparing subgrades for walks, pavements, turf and grasses and plants.
3. Excavating and backfilling for structures.
4. Subbase course for concrete walks.
5. Subsurface drainage backfill for walls and trenches.
6. Excavating and backfilling trenches for utilities and pits for buried utility structures.

B. Related Requirements:

1. Section 311000 "Site Clearing" for site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
2. Section 329200 "Turf and Grasses" for finish grading in turf and grass areas, including preparing and placing planting soil for turf areas.
3. Section 329300 "Plants" for finish grading in planting areas and tree and shrub pit excavation and planting.

1.2 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by City and/or Landscape Architect.
2. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.
3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by City and/or Landscape Architect, will be without additional compensation.

G. Fill: Soil materials used to raise existing grades.

H. Rock:

1. Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. for bulk excavation or 3/4 cu. yd. for footing, trench, and pit excavation that cannot be removed by rock-excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:
2. Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material 3/4 cu. yd. or more in volume that exceed a standard penetration resistance of 100 blows/2 inches when tested by a geotechnical testing agency, according to ASTM D1586.

I. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other fabricated stationary features constructed above or below the ground surface.

J. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

K. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

L. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of the following manufactured products required:

1. Geotextiles.
2. Controlled low-strength material, including design mixture.
3. Warning tapes.

B. Samples for Verification: For the following products, in sizes indicated below:

1. Geotextile: 12 by 12 inches.

2. Warning Tape: 12 inches long; of each color.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Material Test Reports: For each on-site soil material proposed for fill and backfill as follows:
 1. Classification according to ASTM D2487.
 2. Laboratory compaction curve according to ASTM D698.
- C. Preexcavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earth-moving operations. Submit before earth moving begins.

1.5 QUALITY ASSURANCE

- A. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E329 and ASTM D3740 for testing indicated.

1.6 FIELD CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth-moving operations.
 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from City and authorities having jurisdiction.
 2. Provide alternate routes around closed or obstructed traffic ways if required by City or authorities having jurisdiction.
- B. Utility Locator Service: Notify "Call Before You Dig" for area where Project is located before beginning earth-moving operations.
- C. Do not commence earth-moving operations until temporary site fencing and erosion-and sedimentation-control measures specified in Section 015000 "Temporary Facilities and Controls" and Section 311000 "Site Clearing" are in place.
- D. The following practices are prohibited within protection zones:
 1. Storage of construction materials, debris, or excavated material.
 2. Parking vehicles or equipment.
 3. Foot traffic.
 4. Erection of sheds or structures.
 5. Impoundment of water.
 6. Excavation or other digging unless otherwise indicated.
 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

- E. Do not direct vehicle or equipment exhaust towards protection zones.
- F. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D2487 or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D2487 or a combination of these groups.
 - 1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.
- F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.
- H. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and zero to 5 percent passing a No. 8 sieve.
- I. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and zero to 5 percent passing a No. 4 sieve.

- J. Sand: ASTM C33/C33M; fine aggregate.
- K. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.2 ACCESSORIES

- A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored as follows:
 - 1. Red: Electric.
 - 2. Yellow: Gas, oil, steam, and dangerous materials.
 - 3. Orange: Telephone and other communications.
 - 4. Blue: Water systems.
 - 5. Green: Sewer systems.
- B. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:
 - 1. Red: Electric.
 - 2. Yellow: Gas, oil, steam, and dangerous materials.
 - 3. Orange: Telephone and other communications.
 - 4. Blue: Water systems.
 - 5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.
- B. Protect and maintain erosion and sedimentation controls during earth-moving operations.
- C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials

may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:
 - a. 24 inches outside of concrete forms other than at footings.
 - b. 12 inches outside of concrete forms at footings.
 - c. 6 inches outside of minimum required dimensions of concrete cast against grade.
 - d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
 - e. 6 inches beneath bottom of concrete slabs-on-grade.
 - f. 6 inches beneath pipe in trenches and the greater of 24 inches wider than pipe or 42 inches wide.

3.3 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.4 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.
 1. Clearance: As indicated on Drawings.
- C. Trench Bottoms:
 1. Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
 - a. For pipes and conduit less than 6 inches in nominal diameter, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
 - b. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe or conduit circumference. Fill depressions with tamped sand backfill.
 - c. For flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support conduit on an undisturbed subgrade.

- d. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.
- 2. Excavate trenches 4 inches deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.
 - a. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

3.5 SUBGRADE INSPECTION

- A. Notify City and/or Landscape Architect when excavations have reached required subgrade.
- B. If City and/or Landscape Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- C. Proof-roll subgrade to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
 - 1. Completely proof-roll subgrade in one direction. Limit vehicle speed to 3 mph.
 - 2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by City and/or Landscape Architect, and replace with compacted backfill or fill as directed.
- D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.6 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Architect.
 - 1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

3.7 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.8 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
 - 1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
 - 2. Surveying locations of underground utilities for Record Documents.
 - 3. Testing and inspecting underground utilities.
 - 4. Removing concrete formwork.
 - 5. Removing trash and debris.
 - 6. Removing temporary shoring, bracing, and sheeting.
 - 7. Installing permanent or temporary horizontal bracing on horizontally supported walls.
- B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.9 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Section 033000 "Cast-in-Place Concrete."
- D. Backfill voids with satisfactory soil while removing shoring and bracing.
- E. Initial Backfill:
 - 1. Soil Backfill: Place and compact initial backfill of satisfactory soil, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.
 - a. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
 - 2. Controlled Low-Strength Material: Place initial backfill of controlled low-strength material to a height of 12 inches over the pipe or conduit. Coordinate backfilling with utilities testing.
- F. Final Backfill:
 - 1. Soil Backfill: Place and compact final backfill of satisfactory soil to final subgrade elevation.

2. Controlled Low-Strength Material: Place final backfill of controlled low-strength material to final subgrade elevation.
- G. Warning Tape: Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.10 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
 1. Under grass and planted areas, use satisfactory soil material.
 2. Under walks and pavements, use satisfactory soil material.
 3. Under steps and ramps, use engineered fill.
 4. Under footings and foundations, use engineered fill.
- C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.11 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
 2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.12 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D698:
 1. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 92 percent.
 2. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.
 3. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

3.13 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 - 1. Provide a smooth transition between adjacent existing grades and new grades.
 - 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:
 - 1. Turf or Unpaved Areas: Plus or minus 1 inch.
 - 2. Walks: Plus or minus 1 inch.
 - 3. Pavements: Plus or minus 1/2 inch.

3.14 SUBSURFACE DRAINAGE

- A. Subsurface Drain: Place subsurface drainage geotextile around perimeter of subdrainage trench. Place a 6-inch course of filter material on subsurface drainage geotextile to support subdrainage pipe. Encase subdrainage pipe in a minimum of 12 inches of filter material, placed in compacted layers 6 inches thick, and wrap in subsurface drainage geotextile, overlapping sides and ends at least 6 inches.
 - 1. Compact each filter material layer to 85 percent of maximum dry unit weight according to ASTM D698 with a minimum of two passes of a plate-type vibratory compactor.
- B. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within 12 inches of final subgrade, in compacted layers 6 inches thick. Overlay drainage backfill with one layer of subsurface drainage geotextile, overlapping sides and ends at least 6 inches.
 - 1. Compact each filter material layer to 85 percent of maximum dry unit weight according to ASTM D698 with a minimum of two passes of a plate-type vibratory compactor.
 - 2. Place and compact impervious fill over drainage backfill in 6-inch-thick compacted layers to final subgrade.

3.15 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

- A. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place subbase course and base course under pavements and walks as follows:

1. Install separation geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
 2. Shape subbase course and base course to required crown elevations and cross-slope grades.
 3. Place subbase course and base course 6 inches or less in compacted thickness in a single layer.
 4. Place subbase course and base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
 5. Compact subbase course and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D698.
- C. Pavement Shoulders: Place shoulders along edges of subbase course and base course to prevent lateral movement. Construct shoulders, at least 12 inches wide, of satisfactory soil materials and compact simultaneously with each subbase and base layer to not less than 95 percent of maximum dry unit weight according to ASTM D698.

3.16 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.
- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.
- C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.
- D. Testing agency will test compaction of soils in place according to ASTM D1556, ASTM D2167, ASTM D2937, and ASTM D6938, as applicable. Tests will be performed at the following locations and frequencies:
1. Paved Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of paved area but in no case fewer than three tests.
 2. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 150 feet or less of trench length but no fewer than two tests.
- E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.17 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
 - 1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.18 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off City's property.
- B. Transport surplus satisfactory soil to designated storage areas on City's property. Stockpile or spread soil as directed by City.
 - 1. Remove waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off City's property.

END OF SECTION 312000

SECTION 321216 - ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Hot-mix asphalt paving.
- B. Related Requirements:
 - 1. Section 312000 "Earth Moving" for subgrade preparation, fill material, separation geotextiles, unbound-aggregate subbase and base courses, and aggregate pavement shoulders.
 - 2. Section 321313 "Concrete Paving" for concrete pavement and for separate concrete curbs, gutters, and driveway aprons.
 - 3. Section 321373 "Concrete Paving Joint Sealants" for joint sealants and fillers at pavement terminations.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to hot-mix asphalt paving including, but not limited to, the following:
 - a. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
 - b. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.

1.4 ACTION SUBMITTALS

- A. Product Data: Include technical data and tested physical and performance properties.
 - 1. Herbicide.
 - 2. Paving geotextile.
 - 3. Joint sealant.
- B. Hot-Mix Asphalt Designs:

1. Certification, by authorities having jurisdiction, of approval of each hot-mix asphalt design proposed for the Work.
 2. For each hot-mix asphalt design proposed for the Work.
- C. Samples for Verification: For the following product, in manufacturer's standard sizes unless otherwise indicated:
1. Paving Geotextile: 12 by 12 inches minimum.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For paving-mix manufacturer and testing agency.
- B. Material Certificates: Include statement that mixes containing recycled materials will perform equal to mixes produced from all new materials.
1. Aggregates.
 2. Asphalt binder.
 3. Asphalt cement.
 4. Cutback prime coat.
 5. Emulsified asphalt prime coat.
 6. Tack coat.
 7. Undersealing asphalt.
- C. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by authorities having jurisdiction or the DOT of state in which Project is located.
- B. Testing Agency Qualifications: Qualified in accordance with ASTM D3666 for testing indicated.
- C. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements for asphalt paving work.
1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:
1. Prime Coat: Minimum surface temperature of 60 deg F.
 2. Tack Coat: Minimum surface temperature of 60 deg F.
 3. Slurry Coat: Comply with weather limitations in ASTM D3910.

4. Asphalt Base Course and Binder Course: Minimum surface temperature of 40 deg F and rising at time of placement.
5. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.

PART 2 - PRODUCTS

2.1 AGGREGATES

- A. General: Use materials and gradations that have performed satisfactorily in previous installations.
- B. Coarse Aggregate: ASTM D692/D692M, sound; angular crushed stone, crushed gravel, or cured, crushed blast-furnace slag.
- C. Fine Aggregate: ASTM D1073 or AASHTO M 29, sharp-edged natural sand or sand prepared from stone, gravel, cured blast-furnace slag, or combinations thereof.
 1. For hot-mix asphalt, limit natural sand to a maximum of 20 percent by weight of the total aggregate mass.
- D. Mineral Filler: ASTM D242/D242M or AASHTO M 17, rock or slag dust, hydraulic cement, or other inert material.

2.2 ASPHALT MATERIALS

- A. Asphalt Binder: ASTM D6373 or AASHTO M 320 binder designation PG 64-22.
- B. Asphalt Cement: ASTM D3381/D3381M for viscosity-graded material.
- C. Cutback Prime Coat: ASTM D2027/D2027M, medium-curing cutback asphalt, MC-30 or MC-70.
- D. Emulsified Asphalt Prime Coat: ASTM D977 or AASHTO M 140 emulsified asphalt, or ASTM D2397/D2397M or AASHTO M 208 cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.
- E. Tack Coat: ASTM D977 or AASHTO M 140 emulsified asphalt, or ASTM D2397/D2397M or AASHTO M 208 cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.
- F. Water: Potable.
- G. Undersealing Asphalt: ASTM D3141/D3141M; pumping consistency.

2.3 AUXILIARY MATERIALS

- A. Herbicide: Commercial chemical for weed control, registered by the EPA, and not classified as "restricted use" for locations and conditions of application. Provide in granular, liquid, or wettable powder form.
- B. Sand: ASTM D1073 or AASHTO M 29, Grade No. 2 or No. 3.
- C. Paving Geotextile: AASHTO M 288 paving fabric; nonwoven polypropylene; resistant to chemical attack, rot, and mildew; and specifically designed for paving applications.
- D. Joint Sealant: ASTM D6690, Type I, hot-applied, single-component, polymer-modified bituminous sealant.

2.4 MIXES

- A. Hot-Mix Asphalt: Dense-graded, hot-laid, hot-mix asphalt plant mixes; designed in accordance with procedures in AI MS-2, "Asphalt Mix Design Methods"; and complying with the following requirements:
 - 1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.
- B. Emulsified-Asphalt Slurry: ASTM D3910, Type 1.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that subgrade is dry and in suitable condition to begin paving.
- B. Proceed with paving only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Protection: Provide protective materials, procedures, and worker training to prevent asphalt materials from spilling, coating, or building up on curbs, driveway aprons, manholes, and other surfaces adjacent to the Work.
- B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
 - 1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
 - 2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Landscape Architect, and replace with compacted backfill or fill as directed.

3.3 SURFACE PREPARATION

- A. Ensure that prepared subgrade has been proof-rolled and is ready to receive paving. Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces.
- B. Herbicide Treatment: Apply herbicide in accordance with manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.
 - 1. Mix herbicide with prime coat if formulated by manufacturer for that purpose.
- C. Cutback Prime Coat: Apply uniformly over surface of compacted unbound-aggregate base course at a rate of 0.15 to 0.50 gal./sq. yd. Apply enough material to penetrate and seal, but not flood, surface. Allow prime coat to cure.
 - 1. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.
 - 2. Protect primed substrate from damage until ready to receive paving.
- D. Emulsified Asphalt Prime Coat: Apply uniformly over surface of compacted unbound-aggregate base course at a rate of 0.10 to 0.30 gal./sq. yd. per inch depth. Apply enough material to penetrate and seal, but not flood, surface. Allow prime coat to cure.
 - 1. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.
 - 2. Protect primed substrate from damage until ready to receive paving.
- E. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd.
 - 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 - 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.4 INSTALLATION OF PAVING GEOTEXTILE

- A. Apply asphalt cement uniformly to existing pavement surfaces at a rate of 0.20 to 0.30 gal./sq. yd.
- B. Place paving geotextile promptly in accordance with manufacturer's written instructions. Broom or roll geotextile smooth and free of wrinkles and folds. Overlap longitudinal joints 4 inches and transverse joints 6 inches.
- C. Protect paving geotextile from traffic and other damage, and place hot-mix asphalt overlay the same day.

3.5 HOT-MIX ASPHALT PLACEMENT

- A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand in areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.
 - 1. Place hot-mix asphalt base course and binder course in number of lifts and thicknesses indicated.
 - 2. Place hot-mix asphalt surface course in single lift.
 - 3. Spread mix at a minimum temperature of 250 deg F.
 - 4. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes unless otherwise indicated.
 - 5. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
- B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.
 - 1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Overlap mix placement about 1 to 1-1/2 inches from strip to strip to ensure proper compaction of mix along longitudinal joints.
 - 2. Complete a section of asphalt base course and binder course before placing asphalt surface course.
- C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.6 JOINTS

- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.
 - 1. Clean contact surfaces and apply tack coat to joints.
 - 2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
 - 3. Offset transverse joints, in successive courses, a minimum of 24 inches.
 - 4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints as indicated on Drawings.
 - 5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
 - 6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.7 COMPACTION

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.
 - 1. Complete compaction before mix temperature cools to 185 deg F.
- B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.
- C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
 - 1. Average Density, Marshall Test Method: 96 percent of reference laboratory density in accordance with ASTM D6927 or AASHTO T 245, but not less than 94 percent or greater than 100 percent.
 - 2. Average Density, Rice Test Method: 92 percent of reference maximum theoretical density in accordance with ASTM D2041/D2041M, but not less than 90 percent or greater than 96 percent.
- D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
- F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.
- G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.8 INSTALLATION TOLERANCES

- A. Pavement Thickness: Compact each course to produce thickness indicated within the following tolerances:
 - 1. Base Course and Binder Course: Plus or minus 1/2 inch.
 - 2. Surface Course: Plus 1/4 inch, no minus.

- B. Pavement Surface Smoothness: Compact each course to produce surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:
 - 1. Base Course and Binder Course: 1/4 inch.
 - 2. Surface Course: 1/8 inch.
 - 3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.
- C. Asphalt Traffic-Calming Devices: Compact and form asphalt to the shapes indicated and within a tolerance of plus or minus 1/8 inch of height indicated above pavement surface.

3.9 SURFACE TREATMENTS

- A. Slurry Seals: Apply slurry coat in a uniform thickness in accordance with ASTM D3910 and allow to cure.
 - 1. Roll slurry seal to remove ridges and provide a uniform, smooth surface.

3.10 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined in accordance with ASTM D3549/D3549M.
- C. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.
- D. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement in accordance with ASTM D979/D979M or AASHTO T 168.
 - 1. Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared in accordance with ASTM D2041/D2041M, and compacted in accordance with job-mix specifications.
 - 2. In-place density of compacted pavement will be determined by testing core samples in accordance with ASTM D1188 or ASTM D2726/D2726M.
 - a. One core sample will be taken for every 1000 sq. yd. or less of installed pavement, with no fewer than three cores taken.
 - b. Field density of in-place compacted pavement may also be determined by nuclear method in accordance with ASTM D2950/D2950M and coordinated with ASTM D1188 or ASTM D2726/D2726M.
- E. Replace and compact hot-mix asphalt where core tests were taken.
- F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.11 WASTE HANDLING

- A. General: Handle asphalt-paving waste in accordance with approved waste management plan.

END OF SECTION 321216

SECTION 321313 - CONCRETE PAVING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes concrete paving including the following:
 - 1. Walks.
 - 2. Colored concrete paving.
- B. Related Requirements:
 - 1. Section 321373 "Concrete Paving Joint Sealants" for joint sealants in expansion and contraction joints within concrete paving and in joints between concrete paving and asphalt paving or adjacent construction.

1.2 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash, slag cement, and other pozzolans.
- B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Verification: For each type of product, ingredient, or admixture requiring color, pattern, or texture selection.
- C. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified ready-mix concrete manufacturer and testing agency.
- B. Material Certificates: For the following, from manufacturer:
 - 1. Cementitious materials.
 - 2. Steel reinforcement and reinforcement accessories.
 - 3. Admixtures.
 - 4. Curing compounds.
 - 5. Applied finish materials.
 - 6. Bonding agent or epoxy adhesive.
 - 7. Joint fillers.

C. Material Test Reports: For each of the following:

1. Aggregates.

D. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer of decorative concrete paving systems.

B. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").

C. Testing Agency Qualifications: Qualified according to ASTM C1077 and ASTM E329 for testing indicated.

1. Personnel conducting field tests must be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

D. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockups of full-thickness sections of concrete paving to demonstrate typical joints; surface finish, texture, and color; curing; and standard of workmanship.
2. Build mockups of concrete paving in the location and of the size indicated or, if not indicated, build mockups where directed by City and/or Landscape Architect and not less than 96 inches by 96 inches.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless City and/or Landscape Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified independent testing agency to perform preconstruction testing on concrete paving mixtures.

1.7 FIELD CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.
- B. Cold-Weather Concrete Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
 - 1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
 - 2. Do not use frozen materials or materials containing ice or snow.
 - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.
- C. Hot-Weather Concrete Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:
 - 1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - 2. Fog-spray forms and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with ACI 301 unless otherwise indicated.

2.2 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.
 - 1. Use flexible or uniformly curved forms for curves with a radius of 100 feet or less.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.3 STEEL REINFORCEMENT

- A. Plain-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, fabricated from as-drawn galvanized-steel wire into flat sheets.
- B. Reinforcing Bars: ASTM A615/A615M, Grade 60; deformed.
- C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded-wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:
 - 1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
 - 2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.

2.4 CONCRETE MATERIALS

- A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- B. Cementitious Materials: Use the following cementitious materials, of same type, brand, and source throughout Project:
 - 1. Portland Cement: ASTM C150/C150M, gray portland cement.
 - 2. Fly Ash: ASTM C618, Class C or Class F.
 - 3. Slag Cement: ASTM C989/C989M, Grade 100 or 120.
 - 4. Blended Hydraulic Cement: ASTM C595/C595M, Type IS, portland blast-furnace slag cement.
- C. Normal-Weight Aggregates: ASTM C33/C33M, uniformly graded. Provide aggregates from a single source with documented service-record data of at least 10 years' satisfactory service in similar paving applications and service conditions using similar aggregates and cementitious materials.
 - 1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- D. Air-Entraining Admixture: ASTM C260/C260M.
- E. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.
 - 1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
 - 2. Retarding Admixture: ASTM C494/C494M, Type B.
 - 3. Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type D.

4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type G.
 6. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.
- F. Color Pigment: ASTM C979/C979M, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.
- G. Water: Potable and complying with ASTM C94/C94M.

2.5 SURFACE COLORING MATERIALS

- A. Pigmented Mineral Dry-Shake Hardener: Factory-packaged, dry combination of portland cement, graded quartz aggregate, color pigments, and plasticizing admixture. Use color pigments that are finely ground, nonfading mineral oxides interground with cement.
- B. Pigmented Powder Release Agent: Factory-packaged, dry combination of surface-conditioning and dispersing agents interground with color pigments that facilitates release of stamp mats. Use color pigments that are finely ground, nonfading mineral oxides interground with cement.
- C. Liquid Release Agent: Manufacturer's standard, clear, evaporating formulation that facilitates release of stamp mats and texture rollers.

2.6 CURING MATERIALS

- A. Moisture-Retaining Cover: ASTM C171, polyethylene film or white burlap-polyethylene sheet.
- B. Water: Potable.
- C. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.

2.7 RELATED MATERIALS

- A. Joint Fillers: ASTM D1751, asphalt-saturated cellulosic fiber.
- B. Bonding Agent: ASTM C1059/C1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- C. Epoxy-Bonding Adhesive: ASTM C881/C881M, two-component epoxy resin capable of humid curing and bonding to damp surfaces; of class suitable for application temperature, of grade complying with requirements.

2.8 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
 - 2. When automatic machine placement is used, determine design mixtures and obtain laboratory test results that comply with or exceed requirements.
- B. Cementitious Materials: Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.
 - 1. Fly Ash or Pozzolan: 25 percent.
 - 2. Slag Cement: 50 percent.
 - 3. Combined Fly Ash or Pozzolan, and Slag Cement: 50 percent, with fly ash or pozzolan not exceeding 25 percent.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- D. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing admixture in concrete as required for placement and workability.
 - 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
- E. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.
- F. Concrete Mixtures: Normal-weight concrete.
 - 1. Compressive Strength (28 Days): 3500 psi.
 - 2. Maximum W/C Ratio at Point of Placement: 0.50.
 - 3. Slump Limit: 4 inches, plus or minus 1 inch.

2.9 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C94/C94M and ASTM C1116/C1116M. Furnish batch certificates for each batch discharged and used in the Work.
 - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding.
 - 1. Completely proof-roll subbase in one direction. Limit vehicle speed to 3 mph.
 - 2. Correct subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch according to requirements in Section 312000 "Earth Moving."
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove loose material from compacted subbase surface immediately before placing concrete.
- B. Protect adjacent construction from discoloration and spillage during application of color hardeners, release agents, stains, curing compounds, and sealers.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 INSTALLATION OF STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded-wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.5 JOINTS

- A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.
 - 1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.
 - 1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
 - 2. Provide tie bars at sides of paving strips where indicated.
 - 3. Butt Joints: Use bonding agent at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.
 - 1. Locate expansion joints as indicated on Drawings.
 - 2. Extend joint fillers full width and depth of joint.
 - 3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
 - 4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
 - 5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
 - 6. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:
 - 1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate grooving-tool marks on concrete surfaces.
 - a. Tolerance: Ensure that grooved joints are within 3 inches either way from centers of dowels.
 - b. Tolerance: Ensure that sawed joints are within 3 inches either way from centers of dowels.

- E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

- A. Before placing concrete, inspect and complete formwork installation and items to be embedded or cast-in.
- B. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- C. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
- D. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.
- E. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- F. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
- G. Screed paving surface with a straightedge and strike off.
- H. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleedwater appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

3.7 FLOAT FINISHING

- A. General: Do not add water to concrete surfaces during finishing operations.
- B. Float Finish: Begin the second floating operation when bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
 - 1. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface, perpendicular to line of traffic, to provide a uniform, fine-line texture.

3.8 INTEGRALLY COLORED CONCRETE FINISH

- A. Integrally Colored Concrete Finish: After final floating, apply the following finish:

1. Burlap Finish: Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.
2. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface, perpendicular to line of traffic, to provide a uniform, fine-line texture.
3. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

3.9 PIGMENTED MINERAL DRY-SHAKE HARDENER APPLICATION

- A. Pigmented Mineral Dry-Shake Hardener Finish: After initial floating, apply dry-shake materials to paving surfaces according to manufacturer's written instructions and as follows:
1. Uniformly apply dry-shake hardener at a rate of 100 lb/100 sq. ft. unless greater amount is recommended by manufacturer to match paving color required.
 2. Uniformly distribute approximately two-thirds of dry-shake hardener over the concrete surface with mechanical spreader; allow hardener to absorb moisture and embed it by power floating. Follow power floating with a second application of pigmented mineral dry-shake hardener, uniformly distributing remainder of material at right angles to first application to ensure uniform color, and embed hardener by final power floating.
 3. After final power floating, apply the following finish:
 - a. Burlap Finish: Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.
 - b. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface, perpendicular to line of traffic, to provide a uniform, fine-line texture.
 - c. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.
- B. Pigmented Powder Release Agent: Uniformly distribute onto dry-shake-hardened and still-plastic concrete at a rate of 3 to 4 lb/100 sq. ft..
- C. Liquid Release Agent: Uniformly mist surface of dry-shake-hardened and still-plastic concrete at a rate of 5 gal/1000 sq. ft..

3.10 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection.
- C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

D. Curing Methods: Cure concrete by moisture curing as follows:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears occurring during installation or curing period, using cover material and waterproof tape.

3.11 SEALER APPLICATION

- A. Clear Acrylic Sealer: Apply uniformly in two coats in continuous operations according to manufacturer's written instructions. Allow first coat to dry before applying second coat, at 90 degrees to the direction of the first coat, using same application methods and rates.
1. Begin sealing dry surface no sooner than 14 days after concrete placement.
 2. Allow stained concrete surfaces to dry before applying sealer.
 3. Thoroughly mix slip-resistance-enhancing additive into sealer before applying sealer according to manufacturer's written instructions. Stir sealer occasionally during application to maintain even distribution of additive.

3.12 PAVING TOLERANCES

- A. Comply with tolerances in ACI 117 and as follows:
1. Elevation: 3/4 inch.
 2. Thickness: Plus 3/8 inch, minus 1/4 inch.
 3. Surface: Gap below 10-foot- long; unleveled straightedge not to exceed 1/2 inch.
 4. Alignment of Tie-Bar End Relative to Line Perpendicular to Paving Edge: 1/2 inch per 12 inches of tie bar.
 5. Lateral Alignment and Spacing of Dowels: 1 inch.
 6. Vertical Alignment of Dowels: 1/4 inch.
 7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: 1/4 inch per 12 inches of dowel.
 8. Joint Spacing: 3 inches.
 9. Contraction Joint Depth: Plus 1/4 inch, no minus.
 10. Joint Width: Plus 1/8 inch, no minus.

3.13 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

- B. Testing Services: Testing and inspecting of composite samples of fresh concrete obtained according to ASTM C172/C172M will be performed according to the following requirements:
1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.
 - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing to be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 2. Slump: ASTM C143/C143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 3. Air Content: ASTM C231/C231M, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 4. Concrete Temperature: ASTM C1064/C1064M; one test hourly when air temperature is 40 deg F and below and when it is 80 deg F and above, and one test for each composite sample.
 5. Compression Test Specimens: ASTM C31/C31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
 6. Compressive-Strength Tests: ASTM C39/C39M; test one specimen at seven days and two specimens at 28 days.
 - a. A compressive-strength test to be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.
- C. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
- D. Test results to be reported in writing to Landscape Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests to contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Landscape Architect but will not be used as sole basis for approval or rejection of concrete.
- F. Additional Tests: Testing and inspecting agency will make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Landscape Architect.
- G. Concrete paving will be considered defective if it does not pass tests and inspections.

- H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- I. Prepare test and inspection reports.

3.14 REPAIR AND PROTECTION

- A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by City and/or Landscape Architect.
- B. Drill test cores, where directed by City and/or Landscape Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.
- C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 321313

SECTION 321373 - CONCRETE PAVING JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cold-applied joint sealants.
2. Hot-applied joint sealants.
3. Joint-sealant backer materials.
4. Primers.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data:

1. Concrete pavement joint sealants.
2. Joint-sealant backer materials.

- B. Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors for each type of joint sealant.

- C. Samples for Verification: Actual sample of finished products for each kind and color of joint sealant required.

1. Size: Joint sealants in 1/2-inch-wide joints formed between two 6-inch-long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

- D. Paving-Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Statements: For Installer and testing agency.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Installers: Entity that employs installers and supervisors who are trained and approved by manufacturer.

1.6 PRECONSTRUCTION TESTING

- A. Preconstruction Testing: Performed by a qualified testing agency.

1.7 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Obtain joint sealants from single manufacturer for each sealant type.

2.2 JOINT SEALANTS, GENERAL

- A. Compatibility: Provide joint sealants, backer materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

2.3 COLD-APPLIED JOINT SEALANTS

- A. Single-Component, Self-Leveling, Silicone Joint Sealant: ASTM D5893/D5893M, Type SL.

2.4 HOT-APPLIED JOINT SEALANTS

- A. Hot-Applied, Single-Component Joint Sealant, Type I or Type II: ASTM D6690.

2.5 JOINT-SEALANT BACKER MATERIALS

- A. Joint-Sealant Backer Materials: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by joint-sealant manufacturer, based on field experience and laboratory testing.
- B. Round Backer Rods for Cold- and Hot-Applied Joint Sealants: ASTM D5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.
- C. Round Backer Rods for Cold-Applied Joint Sealants: ASTM D5249, Type 3, of diameter and density required to control joint-sealant depth and prevent bottom-side adhesion of sealant.
- D. Backer Strips for Cold- and Hot-Applied Joint Sealants: ASTM D5249; Type 2; of thickness and width required to control joint-sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

2.6 PRIMERS

- A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Before installing joint sealants, clean out joints immediately to comply with joint-sealant manufacturer's written instructions.
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
- B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.3 INSTALLATION OF JOINT SEALANTS

- A. Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.
- B. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions.
- C. Install joint-sealant backers to support joint sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of joint-sealant backer materials.
 - 2. Do not stretch, twist, puncture, or tear joint-sealant backer materials.
 - 3. Remove absorbent joint-sealant backer materials that have become wet before sealant application and replace them with dry materials.
- D. Install joint sealants immediately following backer material installation, using proven techniques that comply with the following:
 - 1. Place joint sealants so they fully contact joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Nonsag Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants in accordance with the following requirements to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint:
 - 1. Remove excess joint sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.
- F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.

3.4 CLEANING AND PROTECTION

- A. Clean off excess joint sealant as the Work progresses, by methods and with cleaning materials approved in writing by joint-sealant manufacturers.
- B. Protect joint sealants, during and after curing period, from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations in repaired areas are indistinguishable from the original work.

3.5 PAVING-JOINT-SEALANT SCHEDULE

- A. Joints within concrete paving:
 - 1. Joint Location:
 - a. Expansion and isolation joints in concrete paving.
 - b. Contraction joints in concrete paving.
 - c. Other joints as indicated.
 - 2. Joint Sealant: Single-component, nonsag, silicone joint sealant.
 - 3. Joint-Sealant Color: Match adjacent paving.
- B. Joints within concrete pavement and between concrete and asphalt paving:
 - 1. Joint Location:
 - a. Joints between concrete and asphalt paving.
 - b. Joints between concrete curbs and asphalt paving.
 - c. Other joints as indicated.
 - 2. Joint Sealant: Single-component, nonsag, silicone joint sealant.
 - 3. Joint-Sealant Color: Match adjacent concrete paving.

END OF SECTION 321373

SECTION 321540 – STABILIZED DECOMPOSED GRANITE PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Decomposed Granite Paving
2. Binding/Stabilizing Agent

1.2 SUBMITTALS

A. Manufacturer's product data sheet and installation instructions for each product to be used.

1. Submit 1/2-pound sample and sieve analysis for grading of decomposed granite to be sent to City for review and approval prior to any construction.
2. Submit binding/stabilizing agent to City for review and approval prior to any construction.
3. Manufacturer's installation and maintenance instructions for each product to be used.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Installer to provide evidence to indicate 3 successful installations within the last 5 years of completed stabilized decomposed granite installations similar in design, material, and extent indicated on this project.
- B. Mock-Ups: Install 4 ft. wide x 4 ft. long mock-up of decomposed granite with binding agent at location specified by City. Mock-Up shall remain in place for the duration of the project as a sample for installers to meet quality.
- C. Compaction testing to be provided by contractor, one test per 2,000 square feet of base course.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. General: Comply with Division 1 Product Requirement Section.
- B. Refer to manufacturer's ordering instructions and lead-time requirements to avoid construction delays.
- C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers packaging with identification labels intact.
 1. Coordinate delivery and other schedules to minimize interference with other installation.

D. Storage and Protection:

1. Store materials protected such that they are kept free from mud, dirt, and other foreign materials.
2. Contractor to cover and provide protection of items during the construction process.

1.5 PROJECT/SITE CONDITIONS

- A. Field measurements: Each contractor is required to visit the site of the Work to verify the existing conditions. No adjustments will be made to the Contract Sum for variations in the existing conditions.
- B. Where surfacing is indicated to fit with other construction, verify dimensions of other construction by field measurements before proceeding with the work. Installer shall review and accept the grades provided prior to commencement of work.
- C. Environmental Limitations: Do not install stabilized decomposed granite during rainy conditions or below 40 degrees Fahrenheit and falling.

1.6 WARRANTY

- A. General Warranty: The special warranty specified in this Section shall not deprive the City of other rights the City may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Special Warranty: Submit a written warranty executed by the installer agreeing to repair or replace components of stabilized decomposed granite that fail in materials or workmanship within the specified warranty period. Failures include, but are not limited to, the following:
 1. Premature wear and tear, provided the material is maintained in accordance with manufacturer's written maintenance instructions.
 2. Failure of system to meet performance requirements.
- C. Warranty Period: Contractor shall provide warranty for performance of product. Contractor shall warranty installation of product for the time of one year from completion.
- D. Contractor shall provide, for a period of sixty days, unconditional maintenance and repairs as required.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers:

1. Products named or identified by make or model number, or other designation and described are base products. Base products establish the standards of type, function, dimension, in-service performance, physical properties, appearance, warranty, cost, and other characteristics required by the Project.
2. The burden of proof of equality of proposed products is on the Contractor. Contractor shall provide samples to the City for review and approval.

2.2 MATERIALS

- A. Basis of Design Product: Subject to compliance with requirements, provide Decomposed Granite from the following company:
 1. Manufacturer: Stabilized Decomposed Granite, available through California Landscape Supply, (209-538-8493), www.californialandscapesupply.com, or approved equal.
 2. Color: Gray or approved equal.
- B. Basis of Design Product: Subject to compliance with requirements, provide Binding/Stabilizing Agent from the following company:
 1. Manufacturer: DeGe Pathway Binder and Stabilizer "Psyllium Binder Agent", (800-215-7372), www.caldg.com, or approved equal.
 2. Non-toxic, organic binder that is colorless and odorless concentrated powder that binds decomposed granite.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site Verification of Conditions:
 1. Contractor to notify City before beginning work if plans differ from actual site conditions.
 2. All earthwork shall be performed in accordance with the preceding sections.
 3. Subbase material shall be uniformly graded and compacted, and shall mirror finish grade contours to ensure an even depth of material.

3.2 INSTALLATION

- A. Preparation
 1. Base shall be 3" compacted layer of Class II aggregate base. Make any corrections necessary to base furnished and installed to bring base course to the elevations shown on the drawings.
 2. Pre-soak base material with water and compact to 95% per ASTM D1557 prior to installing

stabilized decomposed granite. Compaction testing to be provided by Contractor, one test per 2,000 square feet of base.

3. Before proceeding with installation, notify, City in writing of unsuitable site/base conditions.

B. Blending Stabilizer

1. Binding agent shall be thoroughly pre-mixed with decomposed granite at a rate of 12-lbs of binding agent per 1-ton of decomposed granite or as specified in manufacturer's specifications. Contractor shall confirm with manufacturer on correct binding agent rate for project and client. Drop spreading of binding agent over pre-placed decomposed granite or mixing by rototilling is not acceptable. Binding agent shall be mechanically pre-mixed per manufacturer's recommendations using an approved mechanical blending unit to adequately blend binding agent with decomposed granite (Bucket blending is not an approved blending apparatus). Always blend binding agent and decomposed granite when both are dry.

C. Placement

1. After pre-blending, place stabilized decomposed granite directly on prepared sub-grade. Level to desired grade and cross section. Depth of surface course shall be 2" and depth of base course shall be 2.5". Do NOT place stabilized decomposed granite on filter fabric.

D. Watering

1. Water heavily for full-depth moisture penetration of profile. Water activates binding agent. Apply 25 to 45-gallons of water per 1-ton of decomposed granite to achieve saturation. Randomly test for depth using a probing device, which reaches full depth.
2. Contractor shall wait a minimum of 6 hours and up to 72 hours until such time that the stabilized decomposed granite is able to accept compaction from a 1 to 5 ton roller without separation, plowing, or any other physical compromise of the decomposed granite.
3. If surface of decomposed granite dries significantly quicker than subsurface material, lightly mist surface before compaction.

E. Compaction

1. Compact stabilized decomposed granite to 85% relative compaction by equipment such as: a 2 to 5-ton double drum roller making 3 to 4 passes. Do not begin compaction for 6 hours after placement and up to 72 hours. Do not use a vibratory plate compactor or vibration feature on roller as vibration separates particles. If pumping or pancaking of surface occurs, surface is still too wet to roll.
2. Take care in compacting surface when adjacent to planting and irrigation systems, use 8" or 10" hand tamp. Installation of stabilized decomposed granite more than 3" thick shall be installed in lifts. If 4" thick compacted (2) 2" lifts. If 5" thick compacted (2) 2.5" lifts. If stabilized decomposed granite is pre-moistened before installation entire 4" or 5" lift may be installed.
3. Lightly spray surface area following compaction. Do not disturb aggregate surface with spray action.

3.3 INSPECTION

- A. Finished surface shall be smooth, uniform, and solid with no evidence of chipping or cracking. Cured and compacted decomposed granite shall be firm throughout profile with no spongy areas. Loose material shall not be present on surface after installation but may appear after use and according to environmental conditions. Decomposed granite shall remain stable underneath loose granite on top with a "natural" look. Any significant irregularities in surface shall be repaired to the uniformity of entire installation. Correct irregularities to the satisfaction of the City.

3.4 PROTECTION

- A. Contractor shall furnish and install construction fence around new surface to prevent public access. Fencing shall be maintained in place for a minimum of 12 hours and up to 72 hours after completion of installation, or as directed by City. Drying period may take longer due to weather conditions.
- B. Contractor shall notify City that landscape irrigation shall be restricted near stabilized decomposed granite surface until drying period is complete. Standing water on surface and adjacent to path shall be restricted at all times.

3.5 MAINTENANCE

- A. Remove debris, such as paper, grass clippings, or organic material by mechanically blowing or hand raking as needed.
- B. During first year, minor amounts of loose decomposed granite may appear on surface (1/16" to 1/4"). If material exceeds 1/4", redistribute over entire surface. Water to 1" depth and compact with power roller of no less than 1,000-lbs. Repeat as needed. If cracking occurs, sweep decomposed granite fines into cracks, water thoroughly and hand tamp with a 8"-10" hand tamp.

3.6 REPAIRS

- A. Excavate damaged area to the depth of the stabilized decomposed granite and square off sidewalks.
- B. If area is dry, moisten damaged portion lightly.
- C. Pre-blend the dry required amount of binding agent with proper amount of decomposed granite in concrete mixer.
- D. Add water to the pre-blended stabilized decomposed granite. Thoroughly moisten mix with 25 to 45 gallons per 1-ton of pre-blended material or to approximately 10% moisture content.
- E. Apply moistened pre-blended stabilized decomposed granite to excavated area to finish grade.
- F. Compact with an 8" to 10" hand tamp or 250 to 300-lb roller. Keep traffic off areas for 12 to 48 hours after repair has been completed.

PART 4 - MEASUREMENT AND PAYMENT

- A. Full compensation for conforming to the requirements of this Section shall be considered as included in the price paid for the various work items complete and in place as shown on the Bid Schedule, and no separate payment shall be made, therefore.

END OF SECTION 321540

SECTION 321816.13 - PLAYGROUND PROTECTIVE SURFACING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Unitary, seamless surfacing.
 - 2. Organic loose-fill surfacing.

1.3 DEFINITIONS

- A. Definitions in ASTM F2223 apply to Work of this Section.
- B. Critical Height: Standard measure of shock attenuation according to ASTM F2223; same as "critical fall height" in ASTM F1292. According to ASTM F1292, this approximates "the maximum fall height from which a life-threatening head injury would not be expected to occur."
- C. SBR: Styrene-butadiene rubber.
- D. Unitary Surfacing: A protective surfacing of one or more material components bound together to form a continuous surface; same as "unitary system" in ASTM F2223.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each type of protective surfacing.
 - 1. Include plans, sections, placement and penetration details, and attachment to substrates.
 - 2. Include accessories and edge terminations.
 - 3. Include patterns made by varying colors of surfacing and details of graphics.
 - 4. Include fall heights and use zones for equipment and structures specified in Section 116800 "Play Field Equipment and Structures," coordinated with the critical heights for protective surfacing.
- C. Samples for Initial Selection: For each type of exposed finish.

1. Include Samples of accessories involving color selection.
- D. Samples for Verification: For each type of protective surfacing and exposed finish.
1. Include Samples of accessories to verify color and finish selection.
 2. Unitary, Seamless Surfacing: Minimum 6 by 6 inches.
 3. Loose-Fill Surfacing: Minimum 1 quart.
 4. Drainage/Separation Geotextile: Minimum 12 by 12 inches.
 5. Drainage Panel: Minimum 6 by 6 inches.
 6. Weed-Control Barrier: Minimum 12 by 12 inches
- E. Product Schedule: For protective surfacing. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and testing agency.
- B. Material Certificates: For each type of loose-fill surfacing.
- C. Product Certificates: For each type of unitary surfacing product.
- D. Field quality-control reports.
- E. Sample Warranty: For manufacturer's special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For playground protective surfacing to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Loose Fill: Amount equal to 1percent of amount installed, but no fewer than 3units

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Mockups: Build mockups to verify selections made under Sample submittals and to set quality standards for materials and execution.
 1. Build mockups for protective surfacing including accessories.

- a. Size: 48 inches by 48 inches.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 WARRANTY

- A. Special Warranty: Manufacturer and Installer agree to repair or replace components of protective surfacing that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Reduction in impact attenuation as measured by reduction of critical fall height.
 - b. Deterioration of protective surfacing and other materials beyond normal weathering.
 2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain protective surfacing materials, including loose-fill accessories, from single source from single manufacturer.
 1. Provide geosynthetic accessories of each type from source recommended by manufacturer of protective surfacing materials.

2.2 PERFORMANCE REQUIREMENTS

- A. Impact Attenuation: Critical fall height tested according to ASTM F1292.
- B. Accessibility Standard: Minimum surfacing performance according to ASTM F1951.

2.3 UNITARY, DUAL-DENSITY, SEAMLESS SURFACING

- A. Description: Manufacturer's standard, site-mixed and applied, two-layer material with wearing layer over cushioning layer, with combined, overall thickness as required, tested for impact attenuation according to ASTM F1292 and for accessibility according to ASTM F1951.
 1. Wearing Layer: Formulation of EPDM rubber particles, binder, and other organic and inorganic components.

2. Cushioning Layer: Formulation of SBR particles and binder.
3. Binder: Weather-resistant, UV-stabilized, flexible, nonhardening, 100 percent solids polyurethane.
4. Lacquer Topcoat: Manufacturer's standard polyurethane-based formulation.
5. Critical Height: As indicated on Drawings.
6. Overall Thickness: Not less than as required for critical height as indicated on Drawings.
7. Primer/Adhesive: Manufacturer's standard primer and weather-resistant, moisture-cured polyurethane adhesive suitable for unit, substrate, and location.
8. Wearing Layer Color(s): As indicated by manufacturer's designations.

- a. Design: Where colored pattern graphic design is required, provide as indicated on Drawings.

- B. Leveling and Patching Material: Portland cement-based grout or epoxy- or polyurethane-based formulation suitable for exterior use and approved by protective surfacing manufacturer.

2.4 ORGANIC LOOSE-FILL SURFACING

- A. Engineered Wood Fiber: ASTM F2075; containing no bark, leaves, twigs, or foreign or toxic materials; tested for accessibility according to ASTM F1951.
 1. Critical Height: As indicated on Drawings.
 2. Uncompressed Material Depth: Not less than as required for critical height indicated as indicated on Drawings.
- B. Double-Shredded Bark Mulch: Random-sized bark, shredded twice, suitable for mulching trees and shrubs, free of metal scrap and other impurities that can cause injuries; complying with the testing and performance requirements for hazardous metals and tramp metal according to ASTM F2075.

2.5 GEOSYNTHETIC ACCESSORIES

- A. Drainage/Separation Geotextiles: Comply with Section 312000 "Earth Moving."
- B. Drainage/Separation Geotextile: Nonwoven, needle-punched geotextile, manufactured for drainage applications and made from polyolefins or polyesters; with the following minimum properties:
 1. Weight: 4 oz./sq. yd.; ASTM D5261.
 2. Water Flow Rate: 100 gpm/sq. ft. according to ASTM D4491.
- C. Drainage Panel: Prefabricated, composite drainage panels made with drainage core and filter fabric.
 1. Drainage Core: Three-dimensional, nonbiodegradable, molded-plastic-sheet material designed to effectively drain water under maximum fill pressures.

2. Fabric: Nonwoven, needle-punched geotextile, specifically manufactured as a filter geotextile and made from polyolefins or polyesters; with the following minimum properties:
 - a. Weight: 4 oz./sq. yd. according to ASTM D5261.
 - b. Water Flow Rate: 135 gpm/sq. ft. according to ASTM D4491.
 3. Minimum Flow Rate: 9 gpm/foot according to ASTM D4491.
- D. Weed-Control Barrier: Composite fabric geotextile consisting of woven, needle-punched polypropylene substrate bonded to a nonwoven polypropylene fabric, weighing not less than 4.8 oz./sq. yd..

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for subgrade elevations, slope, and drainage and for other conditions affecting performance of the Work.
 1. Verify that substrates are sound and without high spots, ridges, holes, and depressions.
- B. Hard-Surface Substrates: Verify that substrates are satisfactory for unitary, protective surfacing installation and that substrate surfaces are dry, cured, and uniformly sloped to drain within recommended tolerances according to protective surfacing manufacturer's written requirements for cross-section profile.
 1. Asphalt Substrates: Verify that substrates are dry, sufficiently cured to bond with adhesive, and free from surface defects, dust, dirt, loose particles, grease, oil, and other contaminants incompatible with protective surfacing or that may interfere with adhesive bond.
 2. Concrete Substrates: Verify that substrates are dry and free from surface defects, laitance, glaze, efflorescence, curing compounds, form-release agents, hardeners, dust, dirt, loose particles, grease, oil, and other contaminants incompatible with protective surfacing or that may interfere with adhesive bond. Determine adhesion, dryness, and acidity characteristics by performing procedures recommended in writing by protective surfacing manufacturer.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates to receive surfacing products according to protective surfacing manufacturer's written instructions.
- B. Hard-Surface Substrates: Clean surface free of laitance, efflorescence, curing compounds, and other contaminants incompatible with protective surfacing.

1. Repair: Fill holes and depressions in unsatisfactory surfaces with leveling and patching material.
2. Treatment: Mechanically abrade or otherwise prepare concrete substrates according to protective surfacing manufacturer's written instructions to achieve adequate roughness.
3. Terminal Edges: Saw cut concrete for terminal edges of protective surfacing.
4. Treat control joints and other nonmoving substrate cracks to prevent telegraphing through protective surfacing.

3.3 INSTALLATION OF GEOSYNTHETIC ACCESSORIES

- A. Install geosynthetic accessories before edging and according to playground surface system manufacturer's and geosynthetic manufacturer's written instructions and in a manner that cannot become a tripping hazard.
 1. Drainage/Separation Geotextile: Completely cover area beneath protective surfacing, overlapping geotextile sides and edges a minimum of 6 inches with manufacturer's standard treatment for overlapping loosely laid seams.
 2. Drainage Panels: Completely cover area beneath protective surfacing, abutting the drainage cores and overlapping seams with geotextile fabric facing with manufacturer's standard treatment overlapping loosely laid seams.
 3. Weed-Control Barrier: Completely cover area beneath loose-fill installation, overlapping barrier edges a minimum of 6 inches with manufacturer's standard treatment for overlapping loosely laid seams.

3.4 INSTALLATION OF SEAMLESS SURFACING

- A. Mix and apply components of seamless surfacing according to manufacturer's written instructions to produce uniform, monolithic, and impact-attenuating protective surfacing of required overall thickness.
 1. Substrate Primer: Apply over prepared substrate at manufacturer's standard spreading rate for type of substrate.
 2. Poured Cushioning Layer: Spread evenly over primed substrate to form a uniform layer applied at manufacturer's standard spreading rate in one continuous operation, with a minimum of cold joints.
 3. Intercoat Primer: Over cured cushioning layer, apply primer at manufacturer's standard spreading rate.
 4. Wearing Layer: Spread over primed base course to form a uniform layer applied at manufacturer's standard spreading rate in one continuous operation and, except where color changes, with no cold joints. Finish surface to produce manufacturer's standard wearing-surface texture.
 - a. Design: Where colored pattern graphic design is required, place colored, design material as soon as previously placed material is sufficiently cured, using primer or adhesive if required by manufacturer's written instructions.
 5. Lacquer Topcoat: Spray or roller applied at manufacturer's standard coating rate in one continuous operation.

6. Edge Treatment: As indicated on Drawings. Fully adhere edges to substrate with full coverage of substrate. Maintain fully cushioned thickness required to comply with performance requirements.

3.5 INSTALLATION OF LOOSE-FILL SURFACING

- A. Apply components of loose-fill surfacing according to manufacturer's written instructions to produce a uniform surface.
- B. Edging: Place and permanently secure edging in place, and attach units to each other.
- C. Loose Fill: Place loose-fill materials to required depth after installation of playground equipment support posts and foundations. Include manufacturer's recommended amount of additional material to offset mechanical compaction.
- D. Grading: Uniformly grade loose fill to an even surface free from irregularities.
- E. Compaction: After initial grading, mechanically compact loose fill before finish grading.
- F. Finish Grading: Hand rake to a uniformly smooth finished surface and to required elevations.

3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests.
- B. Perform the following tests with the assistance of a factory-authorized service representative:
 1. Perform "Installed Surface Performance Test" according to ASTM F1292 for each protective surfacing type and thickness in each playground area.
 2. Perform installed-surface-performance tests at no less than one series of tests for each 1000 sq. ft. of each type and thickness of in-place protective surfacing or part thereof.
- C. Playground protective surfacing will be considered defective if it does not pass tests.
- D. Prepare test reports.

3.7 PROTECTION

- A. Prevent traffic over seamless surfacing for not less than 48 hours after installation.

END OF SECTION 321816.13

SECTION 323119 - DECORATIVE METAL FENCES AND GATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Decorative steel fences.
- B. Related Requirements:
 - 1. Section 033000 "Cast-in-Place Concrete" for post concrete fill.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For fencing and gates.
 - 1. Include plans, elevations, sections, gate locations, post spacing, and mounting attachment details.

1.4 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.
- B. Product Test Reports: For decorative metallic-coated-steel tubular picket fences, including finish, indicating compliance with referenced standard and other specified requirements.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For gate operators to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.

- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
 - 1. Include 8-foot length of fence complying with requirements.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Wind Loading:
 - 1. Fence Height: 0 to 15 feet.
 - 2. Wind Exposure Category: B
 - 3. Design Wind Speed: 105 mph.
- B. Lightning-Protection System: Maximum grounding-resistance value of 25 ohms under normal dry conditions.

2.2 DECORATIVE STEEL FENCES

- A. Decorative Steel Fences: Fences made from steel tubing and shapes, hot-dip galvanized.
- B. Posts: Square steel tubing.
 - 1. Line Posts: As indicated on Drawings.
 - 2. End and Corner Posts: As indicated on Drawings.
- C. Post Caps: As indicated on Drawings.
- D. Rails: Square tubes.
 - 1. Size: As indicated on Drawings.
 - 2. Metal and Thickness: As indicated on Drawings.
- E. Pickets: Square tubes.
 - 1. Terminate tops of pickets at top rail for flush top appearance.
 - 2. Picket Spacing: 3-7/8 inch clear, maximum.
- F. Fasteners: Manufacturer's standard concealed fastening system.
- G. Fabrication: Manufacturer's standard tamperproof, corrosion-resistant, color coated fasteners matching fence components with resilient polymer washers.

2.3 STEEL AND IRON

- A. Plates, Shapes, and Bars: ASTM A36/A36M.
- B. Bars (Pickets): Hot-rolled, carbon steel complying with ASTM A29/A29M, Grade 1010.
- C. Tubing: ASTM A500/A500M, cold-formed steel tubing.

2.4 COATING MATERIALS

- A. Shop Primer for Steel: Manufacturer's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

2.5 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Concrete: Normal-weight, air-entrained, ready-mix concrete complying with requirements in Section 033000 "Cast-in-Place Concrete" with a minimum 28-day compressive strength of 3000 psi, 3-inch slump, and 1-inch maximum aggregate size.
- C. Nonshrink Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M and specifically recommended by manufacturer for exterior applications.

2.6 STEEL FINISHES

- A. Surface Preparation: Clean surfaces according to SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning" and SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning." After cleaning, apply a conversion coating compatible with the organic coating to be applied over it.
- B. Powder Coating: Immediately after cleaning, apply manufacturer's standard two-coat finish consisting of epoxy primer and TGIC polyester topcoat to a minimum total dry film thickness of not less than 8 mils. Comply with coating manufacturer's written instructions.
 - 1. Color and Gloss: As indicated by manufacturer's designations.
- C. Primer Application: Apply zinc-rich epoxy primer immediately after cleaning, to provide a minimum dry film thickness of 2 mils per applied coat, to surfaces that are exposed after assembly and installation, and to concealed surfaces.
- D. Shop-Painted Finish: Comply with Section 099600 "High-Performance Coatings."
- E. High-Performance Coating: Apply intermediate and polyurethane topcoats to prime-coated surfaces. Comply with coating manufacturer's written instructions and with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and

Maintenance Painting of Steel," for shop painting. Apply at spreading rates recommended by coating manufacturer.

1. Match approved Samples for color, texture, and coverage. Remove and refinish, or recoat work that does not comply with specified requirements.

2.7 STEEL FINISHES

- A. Surface Preparation: Clean surfaces of oil and other contaminants. Use cleaning methods that do not leave residue. After cleaning, apply a conversion coating compatible with the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas and apply galvanizing repair paint, complying with SSPC-Paint 20, to comply with ASTM A780/A780M.
- B. Powder Coating: Immediately after cleaning and pretreating, apply manufacturer's standard TGIC polyester powder-coat finish to a minimum dry film thickness of 2 mils.
 1. Color and Gloss: As indicated by manufacturer's designations.
- C. Powder Coating: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat finish consisting of zinc-rich epoxy prime coat and TGIC polyester topcoat to a minimum dry film thickness of 2 mils. Comply with coating manufacturer's written instructions to achieve a minimum total dry film thickness of 4 mils.
 1. Color and Gloss: As indicated by manufacturer's designations.
 2. Comply with surface finish testing requirements in ASTM F2408.
- D. High-Performance Coating: Apply epoxy primer, polyurethane intermediate coat, and polyurethane topcoat to prepared surfaces. Comply with coating manufacturer's written instructions and with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Apply at spreading rates recommended by coating manufacturer.
 1. Match approved Samples for color, texture, and coverage. Remove and refinish, or recoat work that does not comply with specified requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, construction layout, and other conditions affecting performance of the Work.
- B. Do not begin installation before final grading is completed unless otherwise permitted by Landscape Architect.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

3.3 DECORATIVE FENCE INSTALLATION

- A. Install fences according to manufacturer's written instructions.
- B. Install fences by setting posts as indicated and fastening rails and infill panels to posts. Peen threads of bolts after assembly to prevent removal.
- C. Post Excavation: Drill or hand-excavate holes for posts in firm, undisturbed soil. Excavate holes to a diameter of not less than 4 times post size and a depth of not less than 24 inches plus 3 inches for each foot or fraction of a foot that fence height exceeds 4 feet.
- D. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.
 - 1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
 - 2. Concrete Fill: Place concrete around posts and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.
 - a. Exposed Concrete: Extend 2 inches above grade. Finish and slope top surface to drain water away from post.
 - b. Concealed Concrete: Top 2 inches below grade as indicated on Drawings to allow covering with surface material. Slope top surface of concrete to drain water away from post.
 - 3. Posts Set in Concrete: Extend post to within 6 inches of specified excavation depth, but not closer than 3 inches to bottom of concrete.
 - 4. Posts Set into Concrete in Sleeves: Use galvanized-steel pipe sleeves with inside diameter at least 3/4 inch larger than outside diagonal dimension of post, preset and anchored into concrete for installing posts.
 - a. Extend posts at least 5 inches into sleeve.
 - b. After posts have been inserted in sleeves, fill annular space between post and sleeve with nonshrink grout, mixed and placed to comply with grout manufacturer's written instructions; shape and smooth to shed water. Finish and slope top surface of grout to drain water away from post.
 - 5. Posts Set into Voids in Concrete: Form or core drill holes not less than 3/4 inch larger than outside diagonal dimension of post.
 - a. Extend posts at least 5 inches into concrete.
 - b. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink grout, mixed and placed to comply with

- grout manufacturer's written instructions. Finish and slope top surface of grout to drain water away from post.
6. Space posts uniformly at 8 feet o.c.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
 1. Grounding-Resistance Tests: Subject completed grounding system to a megger test at each grounding location. Measure grounding resistance not less than two full days after last trace of precipitation, without soil having been moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural grounding resistance. Perform tests by two-point method according to IEEE 81.
 2. Excessive Grounding Resistance: If resistance to grounding exceeds specified value, notify Landscape Architect promptly. Include recommendations for reducing grounding resistance and a proposal to accomplish recommended work.
 3. Report: Prepare test reports of grounding resistance at each test location certified by a testing agency. Include observations of weather and other phenomena that may affect test results.

END OF SECTION 323119

SECTION 323300 - SITE FURNISHINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

1. Bench.
2. Picnic tables & ADA picnic tables.
3. Trash receptacles.
4. Recycling receptacles.
5. Cornhole Boards.
6. BBQ grill.
7. Basketball Goal.
8. Fabric Shade Sail Structure.

- B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for installing pipe sleeves cast and installing anchor bolts cast in concrete footings.
2. Section 312000 "Earth Moving" for excavation for installing concrete footings.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each type of equipment.
 1. Include plans, elevations, sections, attachment and footing details.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of site equipment.
- B. Material Certificates: For site furnishings manufactured with preservative-treated wood.
- C. Field quality control reports.
- D. Sample Warranty: For manufacturer's special warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For site furnishings to include in maintenance manuals.
- B. Parts list: Provide a list of parts for each site furnishing.
- C. Contact information: Provide installation contractor and manufacturer name, phone, email and address for repairs and servicing.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of equipment that fail in materials and workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures.
 - b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 2. Warranty Period: Minimum of 2 years from date of Final Completion.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Trash Receptacle Inner Containers: Two full-size units for each size indicated.

PART 2 - PRODUCTS

2.1 BENCH

- A. Basis of Design Product: Subject to compliance with requirements, provide Benches from the following company:
 - 1. Manufacturer: As indicated on Drawings or approved equal.
 - 2. Color: As indicated on Drawings.

2.2 PICNIC TABLES & ADA PICNIC TABLES

- A. Basis of Design Product: Subject to compliance with requirements, provide Picnic Tables & ADA compliant Picnic Tables from the following company:
 - 1. Manufacturer: As indicated on Drawings or approved equal.
 - 2. Color: As indicated on Drawings.

2.3 TRASH RECEPTACLES

- A. Basis of Design Product: Subject to compliance with requirements, provide Trash Receptacles from the following company:
 - 1. Manufacturer: As indicated on Drawings or approved equal.
 - 2. Color: As indicated on Drawings.

2.4 RECYCLING RECEPTACLES

- A. Basis of Design Product: Subject to compliance with requirements, provide Recycling Receptacles from the following company:
 - 1. Manufacturer: As indicated on Drawings or approved equal.
 - 2. Color: As indicated on Drawings.

2.5 CORNHOLE BOARDS

- A. Basis of Design Product: Subject to compliance with requirements, provide Cornhole from the following company:
 - 1. Manufacturer: As indicated on Drawings or approved equal.
 - 2. Color: As indicated on Drawings.

2.6 BBQ GRILL

- A. Basis of Design Product: Subject to compliance with requirements, provide BBQ Grill from the following company:
 - 1. Manufacturer: As indicated on Drawings or approved equal.
 - 2. Color: As indicated on Drawings.

2.7 BASKETBALL GOAL

- A. Basis of Design Product: Subject to compliance with requirements, provide Basketball Goal from the following company:
 - 1. Manufacturer: As indicated on Drawings or approved equal.
 - 2. Color: As indicated on Drawings.

2.8 FABRIC SHADE SAIL STRUCTURE

- A. Basis of Design Product: Subject to compliance with requirements, provide Basketball Hoop from the following company:
 - 1. Manufacturer: As indicated on Drawings or approved equal.
 - 2. Color: As indicated on Drawings.

2.9 MATERIALS

- A. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M; recommended in writing by manufacturer, for exterior applications.
- B. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound; resistant to erosion from water exposure without needing protection by a sealer or waterproof coating; recommended in writing by manufacturer, for exterior applications.

2.10 FABRICATION

- A. Metal Components: Form to required shapes and sizes with true, consistent curves, lines, and angles. Separate metals from dissimilar materials to prevent electrolytic action.
- B. Welded Connections: Weld connections continuously. Weld solid members with full-length, full-penetration welds and hollow members with full-circumference welds. At exposed connections, finish surfaces smooth and blended, so no roughness or unevenness shows after finishing and welded surface matches contours of adjoining surfaces.
- C. Pipes and Tubes: Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.
- D. Preservative-Treated Wood Components: Complete fabrication of treated items before treatment if possible. If cut after treatment, apply field treatment complying with AWWA M4 to cut surfaces.
- E. Exposed Surfaces: Polished, sanded, or otherwise finished; all surfaces smooth, free of burrs, barbs, splinters, and sharpness; all edges and ends rolled, rounded, or capped.
- F. Factory Assembly: Factory assemble components to greatest extent possible to minimize field assembly. Clearly mark units for assembly in the field.

2.11 GENERAL FINISH REQUIREMENTS

- A. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.12 ALUMINUM FINISHES

- A. Powder-Coat Finish: Manufacturer's standard polyester powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

2.13 STEEL AND GALVANIZED-STEEL FINISHES

- A. Powder-Coat Finish: Manufacturer's standard polyester, powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.
- B. PVC Finish: Manufacturer's standard, UV-light stabilized, mold-resistant, slip-resistant, matte-textured, dipped or sprayed-on, PVC-plastisol finish, with flame retardant added; complying with coating manufacturer's written instructions for pretreatment, application, and minimum dry film thickness.

2.14 IRON FINISHES

- A. Powder-Coat Finish: Manufacturer's standard polyester powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

2.15 STAINLESS STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - 1. Run directional finishes with long dimension of each piece.
 - 2. Directional Satin Finish: ASTM A480/A480M, No 4.
 - 3. Dull Satin Finish: ASTM A480/A480M, No. 6.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.
- B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.
- C. Install site furnishings level, plumb, true, and securely anchored positioned at locations indicated on Drawings.
- D. Post Setting: Set cast-in support posts in concrete footing with smooth top, shaped to shed water. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at correct angle and are aligned and at correct height and spacing. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.
- E. Pipe Sleeves: Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.

END OF SECTION 323300

SECTION 328400 - PLANTING IRRIGATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipes, tubes, and fittings.
2. Encasement for piping.
3. Manual valves.
4. Automatic remote control valves.
5. Sprinklers.
6. Quick couplers.
7. Drip irrigation specialties.
8. Controllers.
9. Boxes for automatic control valves.

1.2 DEFINITIONS

- A. Circuit Piping: Downstream from control valves to sprinklers, specialties, and drain valves. Piping is under pressure during flow.
- B. Drain Piping: Downstream from circuit-piping drain valves. Piping is not under pressure.
- C. ET Controllers: EvapoTranspiration Controllers. Irrigation controllers, which use some method of weather-based adjustment of irrigation. These adjusting methods include use of historical monthly averages of ET, broadcasting of ET measurements, or use of on-site sensors to track ET.
- D. Main Piping: Downstream from point of connection to water distribution piping to, and including, control valves. Piping is under water-distribution-system pressure.
- E. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories.
- B. Wiring Diagrams: For power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

- A. Zoning Chart: Indicate each irrigation zone and its control valve.
- B. Controller Timing Schedule: Indicate timing settings for each automatic controller zone.
- C. Field Quality-Control Submittals:
 - 1. Field quality-control reports.
- D. Qualification Statements: For Installer.
- E. Delegated design engineer qualifications.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For sprinklers, controllers, and automatic control valves to include in operation and maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of maintenance material items.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and entrance of dirt, debris, and moisture.
- B. Store plastic piping protected from direct sunlight. Support piping to prevent sagging and bending.

1.8 PROJECT CONDITIONS

- A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by City or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:
 - 1. Notify City no fewer than two days in advance of proposed interruption of water service.
 - 2. Do not proceed with interruption of water service without City's written permission.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Irrigation Zone Control: Automatic operation with controller and automatic control valves.
- B. Location of Sprinklers and Specialties: Design location is approximate. Make minor adjustments necessary to avoid plantings and obstructions, such as signs and light standards. Maintain 100 percent irrigation coverage of areas indicated.
- C. Minimum Working Pressures: The following are minimum pressure requirements for piping, valves, and specialties unless otherwise indicated:
 - 1. Irrigation Main Piping: As indicated on Drawings.
 - 2. Circuit Piping: As indicated on Drawings.

2.2 PIPES, TUBES, AND FITTINGS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, and fitting materials, and for joining methods for specific services, service locations, and pipe sizes.
- B. PVC Pipe: ASTM D1785, PVC 1120 compound, Schedules 40 and 80.
 - 1. PVC Socket Fittings: ASTM D2466, Schedules 40 and 80.
 - 2. PVC Threaded Fittings: ASTM D2464, Schedule 80.
 - 3. PVC Socket Unions: Construction similar to that of MSS SP-107, except both headpiece and tailpiece shall be PVC with socket ends.
- C. PVC Pipe, Pressure Rated: ASTM D2241, PVC 1120 compound, Schedule 40.
 - 1. PVC Socket Fittings: ASTM D2467, Schedule 80.
 - 2. PVC Socket Unions: Construction similar to that of MSS SP-107, except both headpiece and tailpiece shall be PVC with socket or threaded ends.

2.3 PIPING JOINING MATERIALS

- A. Solvent Cements for Joining PVC Piping: ASTM D2564. Include primer in accordance with ASTM F656.

2.4 MANUAL VALVES

- A. Plastic Ball Valves:
 - 1. Manufacturer: As indicated on Drawings.
 - 2. Model: SCH 80 union ball valve.
- B. Bronze Gate Valves:

1. Manufacturer: Nibco or approved equal.
2. Model: T-113 K bronze gate shutoff valve with cross handle.

2.5 AUTOMATIC REMOTE CONTROL VALVES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the following products or approved equal:
 1. Manufacturer: Rain Bird or approved equal
 2. Model: As indicated on Drawings.
- B. Plastic, Automatic Remote Control Valves: Each station is variable from approximately 1-XX minutes. Include switch for manual or automatic operation of each station.

2.6 SPRINKLERS

- A. General Requirements: Designed for uniform coverage over entire spray area indicated at available water pressure.
- B. Plastic, Pop-up Rotary Sprinklers:
 1. Manufacturer: Hunter or approved equal.
 2. Model: As indicated on Drawings.

2.7 QUICK COUPLERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the following products or approved equal:
 1. Manufacturer: Rain Bird.
 2. Model: As indicated on Drawings.
- B. Description: Factory-fabricated, bronze or brass, two-piece assembly. Include coupler water-seal valve; removable upper body with spring-loaded or weighted, rubber-covered cap; hose swivel with ASME B1.20.7, 3/4-11.5NH threads for garden hose on outlet; and operating key.
 1. Locking-Top Option: Vandal-resistant locking feature. Include one matching key(s).

2.8 DRIP IRRIGATION SPECIALTIES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the following products or approved equal:
 1. Manufacturer: Rain Bird.
 2. Low flow point source emitters: As indicated on Drawings.
 3. Root watering system (RWS) model: As indicated on Drawings.

2.9 CONTROLLERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the following products or approved equal:
1. Manufacturer: Hunter Controller or approved equal with weather sensor.
 2. Model: As indicated on Drawings.

2.10 BOXES FOR AUTOMATIC CONTROL VALVES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the following products or approved equal:
1. Manufacturer: Rain Bird or approved equal.
- B. Plastic Boxes:
1. Description: Box and cover, with open bottom and openings for piping; designed for installing flush with grade.
 - a. Size: As required for valves and service.
 - b. Shape: Round and Rectangular.
 - c. Sidewall Material: PE, ABS, or FRP.
 - d. Cover Material: PE, ABS, or FRP.
- 1) Lettering: "VALVE BOX."
- C. Drainage Backfill: Cleaned gravel or crushed stone, graded from 3/4 inch minimum to 3 inches maximum.

2.11 BOOSTER PUMP**A. System Design Parameters**

IBCM5-1.4-2-1.5/VFD-F/QP System Model Number		19 GPM System Design Flow Rate	70 PSI System Design Pressure	1 ½ INCH System Piping Size
45 PSI Minimum Suction Pressure		208-230 or 460 VAC System Electrical Voltage	1 or 3 PHASE 60 Hz System Electrical Phase and Frequency	
CM5-3 Pump Model Number		19 GPM Pump Capacity (GPM)	85 FEET Pump Total Head (Feet)	
1.4 HP Pump Horsepower	3500 RPM Pump RPM	Undetermined Voltage System Full Load Amperage		

B. Booster Pump Assembly

1. Simplex water pressure booster system as designed and fabricated by Barrett Engineered Pumps. The system shall be a completely prefabricated system with pump, piping, electrical and structural elements.
2. Pump shall be:

- a. (CM) Horizontal multi-stage centrifugal. Pump construction shall be stainless fitted with stainless steel casing, stainless steel impellers and bowls. Pump shall be equipped with mechanical seal. Pump shall be directly coupled to a C-face electric motor.
3. Electric motor shall be of the squirrel cage induction type suitable for full voltage starting. Motor shall be ODP to aid in cooling. Electric motor shall be rated for continuous service. The motor shall conform to the latest NEMA Standards for motor design and construction.
4. Pump Control Panel shall have a NEMA 4X plain front non-metallic enclosure with padlock latches. The Control Panel shall include power and control resettable thermal circuit breakers, heavy duty magnetic starter with adjustable overload protection, Hand-Off-Auto switch to select mode of operation, and heavy duty numbered terminal strips for power and control wiring lead terminations.
5. Metal oxide varistor protected pump start relay(s) incorporated in panel to start pump with signal from each irrigation controller.
6. All system piping shall be type 304 stainless steel. All fittings shall be stainless, with unions or flanges to allow for system disassembly or major component removal.
7. Isolation valves shall be all brass quarter turn ball valves with hard chrome ball.
8. Gauges shall be 2½" diameter face, glycerin filled with stainless casing and brass internals
9. The flow switch shall be a 316 stainless steel and solid-state thermal sensor designed to measure change in flow velocity and in temperature. The flow switch shall include an integrated bar graph with 10 LED lights and shall be capable of providing an indication of flow (green), closed (orange), and open (red) conditions.
10. The pump system shall be mounted on a mounting pad assembly consisting of a reinforced plastic support base, a three sixteenth inch thick 5052 H32 Marine Grade Aluminum mounting pad and 304 grade stainless steel fastening brackets. The support base shall be installed and compacted in earth allowing the top two inches of the support base to be exposed above the earth. The 5052 H32 Marine Grade Aluminum mounting pad shall be clamped to the support base with the stainless-steel fastening brackets.
11. The system enclosure shall be of a vandal and weather resistant nature manufactured entirely of marine grade aluminum alloy 5052-H32, with a wall thickness of one eighth inch. The mounting base shall be manufactured entirely of stainless steel. The main housing shall be of solid sheet construction punched on the sides with a rectangular pattern for viewing backflow operation. The length of the enclosure shall be expandable to allow for site adjustment. The enclosure shall have a mounting lip on one end and a locking mechanism on the other end. The locking mechanism shall be of the full release type, which allows for complete removal of the enclosure from its mounting base without the use of tools. The handle controlling the locking mechanism shall be concealed within the surface of the enclosure and provided for a padlock.
12. Pump Assembly shall include the following option(s):
 - a. **(VFD-F)** Where specified by the System Design Parameters, a **Fuji Variable Frequency Drive** system to receive feedback signal from system mounted stainless steel pressure transducer, and in conjunction with internal software driven PID control loop maintain customer adjustable

constant system discharge pressure by varying the speed of the pump in response to varying system load.

13. The services of a factory representative or trained service professional shall be made available on the job site to check installation and perform the startup and instruct operating personnel. A startup report containing voltage and amperage readings, suction, and discharge pressure readings, estimated flow conditions, and general operating characteristics shall be submitted to the Owner.
14. One electronic set of operating and maintenance manual shall be provided to the owner after startup and shall include parts manuals for major components, performance curve for pump, general sequence of operation, and electrical schematic for control panel.
15. The warranty period shall be a non-prorated period of 36 months from date of purchase.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Section 312000 "Earth Moving."
- B. Install warning tape directly above pressure piping, 12 inches below finished grades, except 6 inches below subgrade under pavement and slabs.
- C. Drain Pockets: Excavate to sizes indicated. Backfill with cleaned gravel or crushed stone, graded from 3/4 to 3 inches, to 12 inches below grade. Cover gravel or crushed stone with sheet of asphalt-saturated felt and backfill remainder with excavated material.
- D. Provide minimum cover over top of underground piping according to the following:
 1. Irrigation Main Piping: Minimum depth of 24 inches below finished grade.
 2. Circuit Piping: Minimum depth of 18 inches below finish grade.
 3. Sleeves: Minimum depth of 24 inches below finish grade.

3.2 PREPARATION

- A. Set stakes to identify locations of proposed irrigation system. Obtain City and/or Landscape Architect's approval before excavation.

3.3 INSTALLATION OF PIPING

- A. Location and Arrangement: Drawings indicate location and arrangement of piping systems. Install piping as indicated unless deviations are approved on Coordination Drawings.
- B. Install piping free of sags and bends.
- C. Install groups of pipes parallel to each other, spaced to permit valve servicing.

- D. Install fittings for changes in direction and branch connections.
- E. Install unions adjacent to valves and to final connections to other components with NPS 2 or smaller pipe connection.
- F. Install flanges adjacent to valves and to final connections to other components with NPS 2-1/2 or larger pipe connection.
- G. Install underground thermoplastic piping in accordance with ASTM D2774 and ASTM F690.
- H. Install expansion loops in control-valve boxes for plastic piping.
- I. Lay piping on solid subbase, uniformly sloped without humps or depressions.
- J. Install PVC piping in dry weather when temperature is above 40 deg F. Allow joints to cure at least 24 hours at temperatures above 40 deg F before testing.
- K. Install piping in sleeves under parking lots, roadways, and sidewalks.
- L. Install sleeves made of Schedule 40, PVC pipe and socket fittings, and solvent-cemented joints.

3.4 JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Threaded Joints: Thread pipe with tapered pipe threads in accordance with ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- D. PVC Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings in accordance with the following:
 - 1. Comply with ASTM F402 for safe-handling practice of cleaners, primers, and solvent cements.
 - 2. PVC Pressure Piping: Join schedule number, ASTM D1785, PVC pipe and PVC socket fittings in accordance with ASTM D2672. Join other-than-schedule-number PVC pipe and socket fittings in accordance with ASTM D2855.
 - 3. PVC Nonpressure Piping: Join in accordance with ASTM D2855.

3.5 INSTALLATION OF SPRINKLERS

- A. Install sprinklers after hydrostatic test is completed.
- B. Install sprinklers at manufacturer's recommended heights.
- C. Locate part-circle sprinklers to maintain a minimum distance of 4 inches from walls and 2 inches from other boundaries unless otherwise indicated.

3.6 INSTALLATION OF DRIP IRRIGATION SPECIALTIES

- A. Install freestanding emitters on pipe riser to mounting height indicated.
- B. Install as indicated on Drawings and per manufacturer's recommendations.

3.7 INSTALLATION OF AUTOMATIC IRRIGATION CONTROL SYSTEM

- A. Install control cable in same trench as irrigation piping and at least 2 inches below piping. Provide conductors of size not smaller than recommended by controller manufacturer. Install cable in separate sleeve under paved areas.

3.8 CONNECTIONS

- A. Comply with requirements for piping specified in Section 331415 "Site Water Distribution Piping" for water supply from exterior water service piping, water meters, protective enclosures, and backflow preventers. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment, valves, and devices to allow service and maintenance.
- C. Connect wiring between controllers and automatic control valves.

3.9 IDENTIFICATION

- A. Identify system components.
- B. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplates and signs on each automatic controller.
 - 1. Text: In addition to identifying unit, distinguish between multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.
- C. Warning Tapes: Arrange for installation of continuous, underground, detectable warning tapes over underground piping during backfilling of trenches. See Section 312000 "Earth Moving" for warning tapes.

3.10 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
- B. Perform tests and inspections.
 - 1. Manufacturer's Field Service with Test Assistance: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- C. Tests and Inspections:
 - 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Operational Test: After electrical circuitry has been energized, operate controllers and automatic control valves to confirm proper system operation.
 - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 4. Irrigation system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

3.11 STARTUP SERVICE

- A. Perform startup service.
 - 1. Complete installation and startup checks in accordance with manufacturer's written instructions.
 - 2. Verify that controllers are installed and connected in accordance with the Contract Documents.
 - 3. Verify that electrical wiring installation complies with manufacturer's submittal.

3.12 ADJUSTING

- A. Adjust settings of controllers.
- B. Adjust automatic control valves to provide flow rate at rated operating pressure required for each sprinkler circuit.
- C. Adjust sprinklers and devices, except those intended to be mounted aboveground, so they will be flush with, or not more than 1/2 inch above, finish grade.

3.13 CLEANING

- A. Flush dirt and debris from piping before installing sprinklers and other devices.

3.14 DEMONSTRATION

- A. Train City's maintenance personnel to adjust, operate, and maintain irrigation system.

3.15 PIPING SCHEDULE

- A. Install components having pressure rating equal to or greater than system operating pressure.
- B. Piping in control-valve boxes and aboveground may be joined with flanges or unions instead of joints indicated.
- C. Underground Irrigation Main Piping, NPS 3 and smaller, shall be the following:
 - 1. SCH 40, PE, controlled ID pipe, insert fittings for PE pipe; and fastener joints.
 - 2. SCH 40, PE, controlled OD pipe; PE butt, heat-fusion, or PE socket-type fittings; and heat-fusion joints.
 - 3. Schedule 80, PVC pipe and socket fittings, and solvent-cemented joints.
- D. Circuit Piping, as shown on Drawings, shall be the following:
 - 1. SCH 40, PE, controlled ID pipe, insert fittings for PE pipe; and fastener joints.
 - 2. SCH 40, PE, controlled OD pipe; PE butt, heat-fusion, or PE socket-type fittings; and heat-fusion joints.
 - 3. Schedule 80, PVC pipe and socket fittings, and solvent-cemented joints.

END OF SECTION 328400

SECTION 329113 - SOIL PREPARATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes planting soils specified by composition of the mixes.
- B. Related Requirements:
 - 1. Section 311000 "Site Clearing" for topsoil stripping and stockpiling.
 - 2. Section 329200 "Turf and Grasses" for placing planting soil for turf and grasses.
 - 3. Section 329300 "Plants" for placing planting soil for plantings.

1.3 ALLOWANCES

- A. Preconstruction and field quality-control testing are part of testing and inspecting allowance.

1.4 DEFINITIONS

- A. AAPFCO: Association of American Plant Food Control Officials.
- B. Backfill: The earth used to replace or the act of replacing earth in an excavation. This can be amended or unamended soil as indicated.
- C. CEC: Cation exchange capacity.
- D. Compost: The product resulting from the controlled biological decomposition of organic material that has been sanitized through the generation of heat and stabilized to the point that it is beneficial to plant growth.
- E. Duff Layer: A surface layer of soil, typical of forested areas, that is composed of mostly decayed leaves, twigs, and detritus.
- F. Imported Soil: Soil that is transported to Project site for use.
- G. Layered Soil Assembly: A designed series of planting soils, layered on each other, that together produce an environment for plant growth.

- H. **Manufactured Soil:** Soil produced by blending soils, sand, stabilized organic soil amendments, and other materials to produce planting soil.
- I. **NAPT:** North American Proficiency Testing Program. An SSSA program to assist soil-, plant-, and water-testing laboratories through interlaboratory sample exchanges and statistical evaluation of analytical data.
- J. **Organic Matter:** The total of organic materials in soil exclusive of undecayed plant and animal tissues, their partial decomposition products, and the soil biomass; also called "humus" or "soil organic matter."
- K. **Planting Soil:** Existing, on-site soil; imported soil; or manufactured soil that has been modified as specified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- L. **RCRA Metals:** Hazardous metals identified by the EPA under the Resource Conservation and Recovery Act.
- M. **SSSA:** Soil Science Society of America.
- N. **Subgrade:** Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
- O. **Subsoil:** Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.
- P. **Surface Soil:** Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil"; but in disturbed areas such as urban environments, the surface soil can be subsoil.
- Q. **USCC:** U.S. Composting Council.

1.5 PREINSTALLATION MEETINGS

- A. **Preinstallation Conference:** Conduct conference at Project site.

1.6 ACTION SUBMITTALS

- A. **Product Data:** For each type of product.
 - 1. Include recommendations for application and use.
 - 2. Include test data substantiating that products comply with requirements.
 - 3. Include sieve analyses for aggregate materials.
 - 4. **Material Certificates:** For each type of imported soil and soil amendment and fertilizer before delivery to the site, according to the following:
 - a. Manufacturer's qualified testing agency's certified analysis of standard products.

- b. Analysis of fertilizers, by a qualified testing agency, made according to AAPFCO methods for testing and labeling and according to AAPFCO's SUIP #25.
 - c. Analysis of nonstandard materials, by a qualified testing agency, made according to SSSA methods, where applicable.
- B. Samples: For each bulk-supplied material, 1-quart volume of each in sealed containers labeled with content, source, and date obtained. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of composition, color, and texture.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For each testing agency.
- B. Preconstruction Test Reports: For preconstruction soil analyses specified in "Preconstruction Testing" Article.
- C. Field quality-control reports.

1.8 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent, state-operated, or university-operated laboratory; experienced in soil science, soil testing, and plant nutrition; with the experience and capability to conduct the testing indicated; and that specializes in types of tests to be performed.
 - 1. Laboratories: Subject to compliance with requirements, provide testing by one of the following soils labs approved by the City.
 - 2. Multiple Laboratories: At Contractor's option, work may be divided among qualified testing laboratories specializing in physical testing, chemical testing, and fertility testing.

1.9 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: City will engage a qualified testing agency to perform preconstruction soil analyses on existing, on-site soil & imported soil.
 - 1. Notify City and/or Landscape Architect seven days in advance of the dates and times when laboratory samples will be taken.
- B. Preconstruction Soil Analyses: For each unamended soil type, perform testing on soil samples and furnish soil analysis and a written report containing soil-amendment and fertilizer recommendations by a qualified testing agency performing the testing according to "Soil-Sampling Requirements" and "Testing Requirements" articles.
 - 1. Have testing agency identify and label samples and test reports according to sample collection and labeling requirements.

1.10 SOIL-SAMPLING REQUIREMENTS

- A. General: Extract soil samples according to requirements in this article.
- B. Sample Collection and Labeling: Have samples taken and labeled by Contractor in presence of soil scientist (CPSS) certified by SSSA or state-certified, -licensed, or -registered soil scientist under the direction of the testing agency.
 - 1. Number and Location of Samples: Minimum of three representative soil samples from varied locations where directed by City for each soil to be used or amended for landscaping purposes.
 - 2. Procedures and Depth of Samples: According to USDA-NRCS's "Field Book for Describing and Sampling Soils."
 - 3. Division of Samples: Split each sample into two, equal parts. Send half to the testing agency and half to City for its records.
 - 4. Labeling: Label each sample with the date, location keyed to a site plan or other location system, visible soil condition, and sampling depth.

1.11 TESTING REQUIREMENTS

- A. General: Perform tests on soil samples according to requirements in this article.
- B. Physical Testing:
 - 1. Soil Texture: Soil-particle, size-distribution analysis by one of the following methods according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods":
 - a. Sieving Method: Report sand-gradation percentages for very coarse, coarse, medium, fine, and very fine sand; and fragment-gradation (gravel) percentages for fine, medium, and coarse fragments; according to USDA sand and fragment sizes.
 - b. Hydrometer Method: Report percentages of sand, silt, and clay.
 - 2. Total Porosity: Calculate using particle density and bulk density according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
 - 3. Water Retention: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
 - 4. Saturated Hydraulic Conductivity: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods"; at 85% compaction according to ASTM D698 (Standard Proctor).
- C. Chemical Testing:
 - 1. CEC: Analysis by sodium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 3- Chemical Methods."
 - 2. Clay Mineralogy: Analysis and estimated percentage of expandable clay minerals using CEC by ammonium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 1- Physical and Mineralogical Methods."

3. Metals Hazardous to Human Health: Test for presence and quantities of RCRA metals including aluminum, arsenic, barium, copper, cadmium, chromium, cobalt, lead, lithium, and vanadium. If RCRA metals are present, include recommendations for corrective action.
 4. Phytotoxicity: Test for plant-available concentrations of phytotoxic minerals including aluminum, arsenic, barium, cadmium, chlorides, chromium, cobalt, copper, lead, lithium, mercury, nickel, selenium, silver, sodium, strontium, tin, titanium, vanadium, and zinc.
- D. Fertility Testing: Soil-fertility analysis according to standard laboratory protocol of SSSA NAPT NCR-13, including the following:
1. Percentage of organic matter.
 2. CEC, calcium percent of CEC, and magnesium percent of CEC.
 3. Soil reaction (acidity/alkalinity pH value).
 4. Buffered acidity or alkalinity.
 5. Nitrogen ppm.
 6. Phosphorous ppm.
 7. Potassium ppm.
 8. Manganese ppm.
 9. Manganese-availability ppm.
 10. Zinc ppm.
 11. Zinc availability ppm.
 12. Copper ppm.
 13. Sodium ppm and sodium absorption ratio.
 14. Soluble-salts ppm.
 15. Presence and quantities of problem materials including salts and metals cited in the Standard protocol. If such problem materials are present, provide additional recommendations for corrective action.
 16. Other deleterious materials, including their characteristics and content of each.
- E. Organic-Matter Content: Analysis using loss-by-ignition method according to SSSA's "Methods of Soil Analysis - Part 3- Chemical Methods."
- F. Recommendations: Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated to produce satisfactory planting soil suitable for healthy, viable plants indicated. Include, at a minimum, recommendations for nitrogen, phosphorous, and potassium fertilization, and for micronutrients.
1. Fertilizers and Soil Amendment Rates: State recommendations in weight per 1000 sq. ft. for 6-inch depth of soil.
 2. Soil Reaction: State the recommended liming rates for raising pH or sulfur for lowering pH according to the buffered acidity or buffered alkalinity in weight per 1000 sq. ft. for 6-inch depth of soil.

1.12 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and compliance with state and Federal laws if applicable.
- B. Bulk Materials:
 - 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
 - 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 - 3. Do not move or handle materials when they are wet or frozen.
 - 4. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.

PART 2 - PRODUCTS

2.1 PLANTING SOILS SPECIFIED BY COMPOSITION

- A. General: Soil amendments, fertilizers, and rates of application specified in this article are guidelines that may need revision based on testing laboratory's recommendations after preconstruction soil analyses are performed.
- B. Planting-Soil Type: Existing, on-site surface soil, with the duff layer, if any, retained; and stockpiled on-site; modified to produce viable planting soil. Blend existing, on-site surface soil with the following soil amendments and fertilizers in the following quantities to produce planting soil: Per Soils Report Findings.
- C. Planting-Soil Type: Imported, naturally formed soil from off-site sources and consisting of sandy loam soil according to USDA textures; and modified to produce viable planting soil.
 - 1. Sources: Take imported, unamended soil from sources that are naturally well-drained sites where topsoil occurs at least 4 inches deep, not from agricultural land, bogs, or marshes; and that do not contain undesirable organisms; disease-causing plant pathogens; or obnoxious weeds and invasive plants including, but not limited to, quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and brome grass.
 - 2. Additional Properties of Imported Soil before Amending: Soil reaction of pH 6 to 7 and minimum of 4 percent organic-matter content, friable, and with sufficient structure to give good tilth and aeration.
 - 3. Unacceptable Properties: Clean soil of the following:
 - a. Unacceptable Materials: Concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner,

- turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.
 - b. Unsuitable Materials: Stones, roots, plants, sod, clay lumps, and pockets of coarse sand that exceed a combined maximum of 8 percent by dry weight of the imported soil.
 - c. Large Materials: Stones, clods, roots, clay lumps, and pockets of coarse sand exceeding 2 inches in any dimension.
 - 4. Amended Soil Composition: Blend imported, unamended soil with the following soil amendments and fertilizers in the following quantities to produce planting soil: Per Soils Report recommendations.
- D. Planting-Soil Type: Manufactured soil consisting of manufacturer's basic soil per soils report recommendations blended in a manufacturing facility with sand, stabilized organic soil amendments, and other materials to produce viable planting soil.
 - 1. Additional Properties of Manufacturer's Basic Soil before Amending: Soil reaction of pH 6 to 7 and organic-matter content per soils report recommendations, friable, and with sufficient structure to give good tilth and aeration.
 - 2. Unacceptable Properties: Manufactured soil shall not contain the following:
 - a. Unacceptable Materials: Concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.
 - b. Unsuitable Materials: Stones, roots, plants, sod, clay lumps, and pockets of coarse sand that exceed a combined maximum of 5 percent by dry weight of the manufactured soil.
 - c. Large Materials: Stones, clods, roots, clay lumps, and pockets of coarse sand exceeding 1-1/2 inches in any dimension.
 - 3. Blend manufacturer's basic soil with the following soil amendments and fertilizers in the following quantities to produce planting soil: per soils report recommendations.

2.2 INORGANIC SOIL AMENDMENTS

- A. Lime: ASTM C602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:
 - 1. Class: T, with a minimum of 99 percent passing through a No. 8 sieve and a minimum of 75 percent passing through a No. 60 sieve.
 - 2. Class: O, with a minimum of 95 percent passing through a No. 8 sieve and a minimum of 55 percent passing through a No. 60 sieve.
 - 3. Form: Provide lime in form of ground dolomitic limestone.
- B. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent elemental sulfur, with a minimum of 99 percent passing through a No. 6 sieve and a maximum of 10 percent passing through a No. 40 sieve.

- C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.
- D. Perlite: Horticultural perlite, soil amendment grade.
- E. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through a No. 50 sieve.
- F. Sand: Clean, washed, natural or manufactured, free of toxic materials, and according to ASTM C33/C33M.

2.3 ORGANIC SOIL AMENDMENTS

- A. Compost: Well-composted, stable, and weed-free organic matter produced by composting feedstock, and bearing USCC's "Seal of Testing Assurance," and as follows:
 - 1. Feedstock: Limited to leaves.
 - 2. Reaction: pH of 5.5 to 8.
 - 3. Soluble-Salt Concentration: Less than 4 dS/m.
 - 4. Moisture Content: 35 to 55 percent by weight.
 - 5. Organic-Matter Content: 30 to 40 percent of dry weight.
 - 6. Particle Size: Minimum of 98 percent passing through a 2-inch sieve.
- B. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, debris, and material harmful to plant growth.

2.4 FERTILIZERS

- A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
 - 1. Composition: 1 lb/1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
 - 2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing agency.
- B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
 - 1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
 - 2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing agency.

PART 3 - EXECUTION

3.1 GENERAL

- A. Place planting soil and fertilizers according to requirements in other Specification Sections.
- B. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in planting soil.
- C. Proceed with placement only after unsatisfactory conditions have been corrected.

3.2 PREPARATION OF UNAMENDED, ON-SITE SOIL BEFORE AMENDING

- A. Excavation: Excavate soil from designated area(s) to a depth of 6 inches and stockpile until amended.
- B. Unacceptable Materials: Clean soil of concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.
- C. Unsuitable Materials: Clean soil to contain a maximum of 8 percent by dry weight of stones, roots, plants, sod, clay lumps, and pockets of coarse sand.
- D. Screening: Pass unamended soil through a 2-inch sieve to remove large materials.

3.3 PLACING AND MIXING PLANTING SOIL OVER EXPOSED SUBGRADE

- A. General: Apply and mix unamended soil with amendments on-site to produce required planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.
- B. Subgrade Preparation: Till subgrade to a minimum depth of 12 inches. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off City's property.
 - 1. Apply, add soil amendments, and mix approximately half the thickness of unamended soil over prepared, loosened subgrade according to "Mixing" Paragraph below. Mix thoroughly into top 4 inches of subgrade. Spread remainder of planting soil.
- C. Mixing: Spread unamended soil to total depth of 12 inches, but not less than required to meet finish grades after mixing with amendments and natural settlement. Do not spread if soil or subgrade is frozen, muddy, or excessively wet.

1. Amendments: Apply soil amendments and fertilizer, if required, evenly on surface, and thoroughly blend them with unamended soil to produce planting soil.
 - a. Mix lime and sulfur with dry soil before mixing fertilizer.
 - b. Mix fertilizer with planting soil no more than seven days before planting.
 2. Lifts: Apply and mix unamended soil and amendments in lifts not exceeding 8 inches in loose depth for material compacted by compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- D. Compaction: Compact each blended lift of planting soil to 75 to 82 percent of maximum Standard Proctor density according to ASTM D698 and tested in-place except where a different compaction value is indicated on Drawings.
- E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.4 PLACING MANUFACTURED PLANTING SOIL OVER EXPOSED SUBGRADE

- A. General: Apply manufactured soil on-site in its final, blended condition. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.
- B. Subgrade Preparation: Till subgrade to a minimum depth of 12 inches. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off City's property.
1. Apply approximately half the thickness of planting soil over prepared, loosened subgrade. Mix thoroughly into top 4 inches of subgrade. Spread remainder of planting soil.
- C. Application: Spread planting soil to total depth of 12 inches, but not less than required to meet finish grades after natural settlement. Do not spread if soil or subgrade is frozen, muddy, or excessively wet.
1. Lifts: Apply planting soil in lifts not exceeding 8 inches in loose depth for material compacted by compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- D. Compaction: Compact each lift of planting soil to 75 to 82 percent of maximum Standard Proctor density according to ASTM D698 except where a different compaction value is indicated on Drawings.
- E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.5 BLENDING PLANTING SOIL IN PLACE

- A. General: Mix amendments with in-place, unamended soil to produce required planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.
- B. Preparation: Till unamended, existing soil in planting areas to a minimum depth of 12 inches. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off City's property.
- C. Mixing: Apply soil amendments and fertilizer, if required, evenly on surface, and thoroughly blend them into full depth of unamended, in-place soil to produce planting soil.
 - 1. Mix lime and sulfur with dry soil before mixing fertilizer.
 - 2. Mix fertilizer with planting soil no more than seven days before planting.
- D. Compaction: Compact blended planting soil to 75 to 82 percent of maximum Standard Proctor density according to ASTM D698 except where a different compaction value is indicated on Drawings.
- E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.6 APPLYING COMPOST TO SURFACE OF PLANTING SOIL

- A. Application: Apply compost component of planting-soil mix to surface of in-place planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.
- B. Finish Grading: Grade surface to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.7 FIELD QUALITY CONTROL

- A. Testing Agency: City will engage a qualified testing agency to perform tests and inspections.
- B. Perform the following tests and inspections:
 - 1. Compaction: Test planting-soil compaction after placing each lift and at completion using a densitometer or soil-compaction meter calibrated to a reference test value based on laboratory testing according to ASTM D698. Space tests at no less than one for each 2000 sq. ft. of in-place soil or part thereof.
- C. Soil will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

- E. Label each sample and test report with the date, location keyed to a site plan or other location system, visible conditions when and where sample was taken, and sampling depth.

3.8 PROTECTION

- A. Protect areas of in-place soil from additional compaction, disturbance, and contamination. Prohibit the following practices within these areas except as required to perform planting operations:
 - 1. Storage of construction materials, debris, or excavated material.
 - 2. Parking vehicles or equipment.
 - 3. Vehicle traffic.
 - 4. Foot traffic.
 - 5. Erection of sheds or structures.
 - 6. Impoundment of water.
 - 7. Excavation or other digging unless otherwise indicated.
- B. If planting soil or subgrade is overcompacted, disturbed, or contaminated by foreign or deleterious materials or liquids, remove the planting soil and contamination; restore the subgrade as directed by Landscape Architect and replace contaminated planting soil with new planting soil.

3.9 CLEANING

- A. Protect areas adjacent to planting-soil preparation and placement areas from contamination. Keep adjacent paving and construction clean and work area in an orderly condition.
- B. Remove surplus soil and waste material including excess subsoil, unsuitable materials, trash, and debris and legally dispose of them off City's property unless otherwise indicated.
 - 1. Dispose of excess subsoil and unsuitable materials on-site where directed by City.

END OF SECTION 329113

SECTION 329200 - TURF AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Seeding
 - 2. Sodding.
- B. Related Requirements:
 - 1. Section 329300 "Plants" for trees, shrubs, ground covers, and other plants as well as border edgings and mow strips.

1.3 DEFINITIONS

- A. Finish Grade: Elevation of finished surface of planting soil.
- B. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
- C. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- D. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Section 329113 "Soil Preparation" and drawing designations for planting soils.
- E. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
- F. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

- G. Surface soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For landscape Installer.
- B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture, stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.
 - 1. Certification of each seed mixture. Include identification of source and name and telephone number of supplier.
- C. Product Certificates: For fertilizers, from manufacturer.
- D. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: Recommended procedures to be established by City for maintenance of turf during a calendar year. Submit before expiration of required maintenance periods.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful turf establishment.
 - 1. Experience: Five projects of similar size and design within the past seven years.
 - 2. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
 - 3. Pesticide Applicator: State licensed, commercial.
 - 4. Soil-Testing Laboratory Qualifications: An independent laboratory or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.
- B. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of the soil.

1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
2. The soil-testing laboratory shall oversee soil sampling, with depth, location, and number of samples to be taken per instructions from County. A minimum of two representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.
3. Report suitability of tested soil for turf growth.
 - a. Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. or volume per cu. yd. for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
 - b. Report presence or problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable.
- B. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" sections in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod within 24 hours of harvesting and in time for planting promptly. Protect sod from breakage and drying.
- C. Bulk Materials:
 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 3. Accompany each delivery of bulk materials with appropriate certificates.

1.9 FIELD CONDITIONS

- A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of planting completion.
 1. Spring Planting,
 2. Fall Planting.
- B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may

be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 TURFGRASS SOD

- A. Turfgrass Sod: Approved, complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture that is strongly rooted and capable of vigorous growth and development when planted.
- B. Turfgrass Species: Sod of grass as indicated on Drawings, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed.

2.2 FERTILIZERS

- A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
 - 1. Composition:
 - a. Actual nitrogen, phosphorous, and potassium, per soils report recommendations.
 - b. Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.
- B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
 - 1. Composition:
 - a. 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
 - b. Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

2.3 ORGANIC SOIL AMENDMENTS

- A. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch sieve; soluble salt content of 5-10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
 - 1. Organic Matter Content: 50 to 60 percent of dry weight.

2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

2.4 PESTICIDES

- A. General: Pesticide, registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.
- B. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
- C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.
 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
 2. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
 3. Uniformly moisten excessively dry soil that is not workable or which is dusty.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Landscape Architect and replace with new planting soil.

3.2 PREPARATION

- A. Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
 1. Protect grade stakes set by others until directed to remove them.
- B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 TURF AREA PREPARATION

- A. General: Prepare planting area for soil placement and mix planting soil according to soils analysis amendment recommendations from soil laboratory.
- B. Placing Planting Soil:
 - 1. Reduce elevation of planting soil to allow for soil thickness of sod.
- C. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- D. Before planting, obtain City's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 SODDING

- A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.
- B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to soil or sod during installation. Tamp and roll lightly to ensure contact with soil, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.
- C. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches below sod.

3.5 TURF MAINTENANCE

- A. General: Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.
 - 1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
 - 2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
 - 3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.
- B. Watering: Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches.

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
 2. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.
- C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:
1. Mow turf to a height of 2 to 3 inch.
- D. Turf Postfertilization: Apply commercial fertilizer after initial mowing and when grass is dry.
1. Use fertilizer that provides actual nitrogen of at least 1 lb/1000 sq. ft. to turf area.

3.6 SATISFACTORY TURF

- A. Turf installations shall meet the following criteria as determined by City
1. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.
- B. Use specified materials to reestablish turf that does not comply with requirements, and continue maintenance until turf is satisfactory.

3.7 PESTICIDE APPLICATION

- A. Apply pesticides and other chemical products and biological control agents according to requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with City's operations and others in proximity to the Work. Notify City before each application is performed.
- B. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

3.8 CLEANUP AND PROTECTION

- A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off City's property.

- C. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.
- D. Remove nondegradable erosion-control measures after grass establishment period.

3.9 MAINTENANCE SERVICE

- A. Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in "Turf Maintenance" Article. Begin maintenance immediately after each area is planted and continue until acceptable turf is established, but for not less than the following periods:
 - 1. Seeded Turf: 120 days from date of Substantial Completion.
 - a. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.
 - 2. Sodded Turf: 120 days from date of Substantial Completion.

END OF SECTION 329200

SECTION 329300 - PLANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Plant materials.
 - 2. Fertilizers.
 - 3. Mulches.
 - 4. Tree-stabilization materials.
 - 5. Landscape edgings.
 - 6. Root Barriers.
- B. Related Requirements:
 - 1. Section 328400 "Planting Irrigation" for complete irrigation systems.
 - 2. Section 329200 "Turf and Grasses" for turf (lawn) and meadow planting, hydroseeding, and erosion-control materials.

1.3 DEFINITIONS

- A. Backfill: The earth used to replace or the act of replacing earth in an excavation.
- B. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.
- C. Finish Grade: Elevation of finished surface of planting soil.
- D. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant. Some sources classify herbicides separately from pesticides.
- E. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and

slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

- F. Planting Area: Areas to be planted.
- G. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See for drawing designations for planting soils recommendations.
- H. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.
- I. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.
- J. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.
- K. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

1.4 COORDINATION

- A. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.
 - 1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Plant materials
 - 2. Fertilizers
 - 3. Mulches
 - 4. Tree-stabilization materials
 - 5. Landscape Edgings
 - 6. Root Barriers
- B. Product Data: For each type of product.
 - 1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
 - 2. Plant Photographs: Include color photographs in digital format of each required species and size of plant material as it will be furnished to Project. Take

photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.

- C. Samples for Verification: For each of the following:
1. Organic Mulch: 1-pint volume of each organic mulch required; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.

1.7 INFORMATIONAL SUBMITTALS

- A. Field Quality-Control Reports: Percolation tests for tree pits. Include the following:
1. Tree identification number matching the plans.
 2. Date of test.
 3. Time when water was added to tree pit to start percolation test.
 4. Time with photo documentation showing increments of testing with water level in tree pit.
 5. Identification of tester.
- B. Qualification Statements: For landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.
- C. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:
1. Manufacturer's certified analysis of standard products.
 2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.
- D. Pesticides and Herbicides: Product label and manufacturer's written application instructions specific to Project.
- E. Sample Warranty: For special warranty.

1.8 CLOSEOUT SUBMITTALS

- A. Maintenance Data: Recommended procedures to be established by City for maintenance of plants during a calendar year. Submit before expiration of required maintenance periods.

1.9 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of plants.

1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
- B. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.
 1. Selection of plants purchased under allowances is made by City and/or Landscape Architect, who tags plants at their place of growth before they are prepared for transplanting
- C. Measurements: Measure in accordance with ANSI Z60.1. Do not prune to obtain required sizes.
 1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container-grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches above the root flare for trees up to 4-inch caliper size, and 12 inches above the root flare for larger sizes.
 2. Other Plants: Measure with stems, petioles, and foliage in their normal position.
- D. Plant Material Observation: Landscape Architect may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Landscape Architect may also observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and may reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.
 1. Notify City and/or Landscape Architect of sources of planting materials seven days in advance of delivery to site.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws if applicable.
- B. Bulk Materials:
 1. Do not dump or store bulk materials near structures, utilities, or walkways and pavements; or on existing turf areas or plants.
 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 3. Accompany each delivery of bulk materials with appropriate certificates.
- C. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy

their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.

- D. Handle planting stock by root ball.
- E. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F until planting.
- F. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.
 - 1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.
- G. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.
- H. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.
 - 1. Shade and protect plants from the wind when stored outside
 - 2. Plants requiring shade shall be stored in a shady/filtered light location or under a temporary sunscreen.
 - 3. Do not store plants on paved surfaces (i.e. Asphalt, concrete, etc.)
 - 4. Protect plants stored on the project from drying out at all times by covering the balls or roots with moist sawdust, wood chips, shredded bark, peat moss, or other similar mulching material.
 - 5. Keep plants, including those in containers, in a moist condition until planted, by watering with fine mist spray.
 - 6. Do not remove container-grown stock from containers before time of planting.
 - 7. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly wet condition.

1.11 FIELD CONDITIONS

- A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.
- B. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.
 - 1. Spring Planting.
 - 2. Fall Planting.

- C. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions in accordance with manufacturer's written instructions and warranty requirements.

1.12 WARRANTY

- A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by City.
 - b. Structural failures, including plantings falling or blowing over.
 - c. Faulty performance of tree stabilization and edgings.
 - d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 2. Warranty Periods: From date of Substantial Completion.
 - a. Trees, Shrubs, and Ornamental Grasses: 12 months.
 - b. Ground Covers and Other Plants: 12 months.
 - 3. Include the following remedial actions as a minimum:
 - a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
 - b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
 - c. A limit of one replacement of each plant is required except for losses or replacements due to failure to comply with requirements.

1.13 MAINTENANCE SERVICE

- A. Initial Maintenance Service (Establishment) for Plants: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.
 - 1. Establishment Period: Thirty (30) days from date of planting completion.
- B. Maintenance Service for Plants: Provide maintenance by skilled employees of landscape installer. Maintain as required in Part 3. Begin maintenance immediately after establishment period is completed, but not prior to final construction punch list for entire project.
 - 1. Maintenance Period: Sixty (60) days.

PART 2 - PRODUCTS

2.1 PLANT MATERIALS

- A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant List, Plant Schedule, or Plant Legend indicated on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
 - 1. Trees with damaged, crooked, or multiple leaders; with tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); with crossing trunks; with cut-off limbs more than 3/4 inch in diameter; or with stem girdling roots are unacceptable.
 - 2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.
- B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Landscape Architect, with a proportionate increase in size of roots or balls.
- C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which begins at root flare in accordance with ANSI Z60.1.
- D. Labeling: Label at least one plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for plant.
- E. If formal arrangements or consecutive order of plants is indicated on Drawings, select stock for uniform height and spread, and number the labels to ensure symmetry in planting.

2.2 FERTILIZERS

- A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
 - 1. Composition:
 - a. 1 lb/1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
 - b. Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

- B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
 - 1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
 - 2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.
- C. Planting Tablets: Tightly compressed chip-type, long-lasting, slow-release, commercial-grade planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a form that can be absorbed by plant roots.
 - 1. Nutrient Composition: 20 percent nitrogen, 10 percent phosphorous, and 5 percent potassium, by weight plus micronutrients.

2.3 MULCHES

- A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:
 - 1. Type: As indicated on Drawings.
 - 2. Size Range: 2 inches maximum, 1/2 inch minimum.
 - 3. Color: As indicated on Drawings.
- B. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through a 1-inch sieve; soluble-salt content of 2 to 5 dS/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
 - 1. Organic Matter Content: 50 to 60 percent of dry weight.
 - 2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

2.4 HERBICIDES AND PESTICIDES

- A. General: Pesticide registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.
- B. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
- C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.
- D. Pesticides: Registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended in writing by manufacturer for each specific

problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

2.5 TREE-STABILIZATION MATERIALS

A. Trunk-Stabilization Materials:

1. Upright and Guy Stakes: Rough-sawn, sound, new hardwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal by length indicated, pointed at one end.
2. Flexible Ties: As indicated on Drawings.

2.6 LANDSCAPE EDGINGS

A. Aluminum Edging: Standard-profile extruded-aluminum edging, ASTM B221, Alloy 6063-T6, fabricated in standard lengths with interlocking sections with loops stamped from face of sections to receive stakes.

1. Edging Size: As indicated on Drawings.
2. Stakes: Aluminum, ASTM B221, Alloy 6061-T6, approximately 1-1/2 inches wide by 12 inches long.
3. Finish: As indicated on Drawings.

2.7 MISCELLANEOUS PRODUCTS

A. Wood Pressure-Preservative Treatment: AWP A U1, Use Category UC4a; acceptable to authorities having jurisdiction, and containing no arsenic or chromium.

B. Root Barrier: Black, molded, modular panels 24 inches high (deep), 85 mils thick, and with vertical root deflecting ribs protruding 3/4 inch out from panel surface; manufactured with minimum 50 percent recycled polyethylene plastic with UV inhibitors.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive plants, with Installer present, for compliance with requirements and conditions affecting installation and performance of the Work.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Verify that plants and vehicles loaded with plants can travel to planting locations with adequate overhead clearance.
3. Suspend planting operations during periods of excessive soil moisture until moisture content reaches acceptable levels to attain required results.

4. Uniformly moisten excessively dry soil that is not workable or which is dusty.
- B. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove soil and contamination as directed by Landscape Architect and replace with new planting soil.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.
- B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Landscape Architect's acceptance of layout before excavating or planting. Make minor adjustments as required.
- D. Lay out plants at locations directed by Landscape Architect. Stake locations of individual trees and shrubs and outline areas for multiple plantings.

3.3 PLANTING AREA ESTABLISHMENT

- A. Finish Grading: Grade planting areas to a smooth uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.
- B. Before planting, obtain City's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.
- C. Soil Preparation: As indicated on Drawings.

3.4 EXCAVATION FOR TREES AND SHRUBS

- A. Planting Pits and Trenches: Excavate circular planting pits.
 1. Excavate planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are unacceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.
 2. Excavate approximately two times as wide as ball diameter for container-grown stock.

3. Excavate at least 12 inches wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
 4. Do not excavate deeper than depth of root ball, measured from the root flare to the bottom of root ball.
 5. If area under the plant was initially dug too deep, add soil to raise it to correct level and thoroughly tamp the added soil to prevent settling.
 6. Maintain angles of repose of adjacent materials to ensure stability. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
 7. Maintain supervision of excavations during working hours.
 8. Keep excavations covered or otherwise protected when unattended by Installer's personnel.
- B. Backfill Soil: Subsoil and topsoil removed from excavations may not be used as backfill soil unless otherwise indicated.
- C. Obstructions: Notify City and/or Landscape Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.
- D. Drainage: Notify City and/or Landscape Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.

3.5 TREE AND SHRUB PLANTING

- A. Before planting, verify that root flare is visible at top of root ball in accordance with ANSI Z60.1. If root flare is not visible, remove soil in a level manner from root ball to where the top-most root emerges from the trunk. After soil removal to expose root flare, verify that root ball still meets size requirements.
- B. Roots: Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.
- C. Container-Grown Stock: Set each plant plumb and in center of planting pit or trench with root flare 1 inch above adjacent finish grades.
1. Backfill: Planting soil. For trees, use excavated soil for backfill.
 2. Carefully remove root ball from container without damaging root ball or plant.
 3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
 4. Place planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.
 - a. Quantity: As indicated on Drawings.
 5. Continue backfilling process. Water again after placing and tamping final layer of soil.

- D. When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

3.6 TREE AND SHRUB PRUNING

- A. Remove only dead, dying, or broken branches. Do not prune for shape.
- B. Prune, thin, and shape trees and shrubs as directed by City and/or Landscape Architect.
- C. Prune, thin, and shape trees and shrubs in accordance with standard professional horticultural and arboricultural practices. Unless otherwise indicated by City and/or Landscape Architect, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.
- D. Do not apply pruning paint to wounds.

3.7 INSTALLATION OF TREE-STABILIZATION MATERIALS

- A. Trunk Stabilization by Upright Staking and Tying: Install trunk stabilization as follows unless otherwise indicated:
 - 1. Upright Staking and Tying:
 - a. Stake trees of 2- through 5-inch caliper. Stake trees as indicated on Drawings and penetrate at least 18 inches below bottom of backfilled excavation and to extend to the dimension indicated on Drawings above grade. Set vertical stakes and space to avoid penetrating root balls or root masses.
 - 2. Support trees with bands of flexible ties at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.

3.8 INSTALLATION OF ROOT BARRIER

- A. Install root barrier where trees are planted within distance indicated on Drawings of paving or other hardscape elements, such as walls, curbs, and walkways, unless otherwise indicated on Drawings.
- B. Install root barrier continuously for distance as indicated on Drawings. If trees are spaced closer, use single continuous piece of root barrier.
 - 1. Position top of root barrier in accordance with manufacturer's written instructions.
 - 2. Overlap root barrier minimum of 12 inches at joints.
 - 3. Do not distort or bend root barrier during construction activities.
 - 4. Do not install root barrier surrounding the root ball of tree.

3.9 GROUND COVER AND PLANT PLANTING

- A. Set out and space ground cover and plants other than trees and shrubs as indicated on Drawings in even rows with triangular spacing unless otherwise indicated on Drawings.
- B. Dig holes large enough to allow spreading of roots.
- C. For rooted cutting plants supplied in flats, plant each in a manner that minimally disturbs the root system but to depth not less than two nodes.
- D. Work soil around roots to eliminate air pockets and leave slight saucer indentation around plants to hold water.
- E. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.
- F. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.10 INSTALLATION OF MULCHES

- A. Mulch backfilled surfaces of planting areas and other areas indicated.
 - 1. Trees in Turf Areas: Apply organic mulch ring of 3-inch average thickness, with 12-inch radius around trunks or stems. Do not place mulch within 3 inches of trunks or stems.
 - 2. Organic Mulch in Planting Areas: Apply 3-inch average thickness of organic mulch over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 3 inches of trunks or stems.

3.11 INSTALLATION OF LANDSCAPE EDGINGS

- A. Aluminum Edging: Install aluminum edging where indicated in accordance with manufacturer's written instructions. Anchor with aluminum stakes spaced as indicated on Drawings, driven below top elevation of edging.

3.12 INSTALLATION OF TREE-WATERING DEVICES

- A. Provide one device for each tree.
- B. Place device on top of the mulch at base of tree stem and fill with water in accordance with manufacturer's written instructions.

3.13 APPLICATION OF PESTICIDES

- A. Apply pesticides and other chemical products and biological control agents according to authorities having jurisdiction and in accordance with manufacturer's written instructions. Coordinate applications with City's operations and others in proximity to the Work. Notify City before each application is performed.

- B. Pre-Emergent Herbicides (Selective and Nonselective): Apply to tree, shrub, and ground-cover areas in accordance with manufacturer's written instructions. Do not apply to seeded areas.
- C. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written instructions.

3.14 REPAIR AND REPLACEMENT

- A. General: Repair or replace existing or new trees and other plants that are damaged by construction operations, in a manner approved by Landscape Architect.
 - 1. Submit details of proposed pruning and repairs.
 - 2. Perform repairs of damaged trunks, branches, and roots within 24 hours, if approved.
 - 3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Landscape Architect.
- B. Remove and replace trees that are more than 25 percent dead or in unhealthy condition before end of corrections period or are damaged during construction operations that the Landscape Architect determines are incapable of restoring to normal growth pattern.
 - 1. Provide new trees of same size as those being replaced for each tree of 6 inches or smaller in caliper size.
 - 2. Provide one new tree(s) of 6-inch caliper size for each tree being replaced that measures more than 6 inches in caliper size.
 - 3. Species of Replacement Trees: Same species being replaced.

3.15 CLEANING AND PROTECTION

- A. During planting, keep adjacent paving and construction clean and work area in an orderly condition. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off City's property.
- C. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.
- D. After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.
- E. At time of Substantial Completion, verify that tree-watering devices are in good working order and leave them in place. Replace improperly functioning devices.

3.16 DISPOSAL

- A. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off City's property.

3.17 MAINTENANCE SERVICE

- A. Maintenance Service for Planting: Provide maintenance by skilled employees of landscape Installer. Maintain as required in "Plant Maintenance" Article. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established, but for not less than maintenance period below:
 - 1. Maintenance Period: 60 days from date of planting completion.

END OF SECTION 329300

Storm Water Pollution Prevention Plan

for:

Sunrise Ranch Park

Manuel Court and Martin Street, Los Banos, CA 93635

WDID: 5F24C404519

Owner:

City of Los Banos

Charles Bergson

520 J Street

Los Banos, CA 93653

209-827-2466

charles.bergson@losbanos.org

Developer/Contractor:

City of Los Banos

Charles Bergson

520 J Street

Los Banos, CA 93653

209-827-2466

charles.bergson@losbanos.org

Qualified SWPPP Practitioner: TBD

Insert Company or Organization Name

Insert Name & Qualifications

Insert Address

Insert City, State, Zip Code

Insert Telephone Number

Insert Fax/Email

Qualified SWPPP Developer:

O'Dell Engineering a Westwood Company

Matt Vinson, C86310

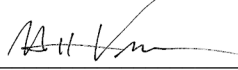
1165 Scenic Drive

Modesto, CA, 95350

(209) 571-1765

matt.vinson@westwoodps.com

Signature: _____



SWPPP Preparation Date: 06/13/2024

SWPPP Amendment Date:

Estimated Project Dates:

Project Start Date: 10/01/2024

Project Completion Date: 05/01/2025

Site Operating Hours: 7:00 am - 5:00 pm

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Appendix A – Construction Site Monitoring Plan
Appendix B – General Location Map
Appendix C – Site Maps
Appendix D – BMP Inspection Checklist
Appendix E – Qualifying Rain Event Forecasts, Inspections, Chain of Custody, and Monitoring Forms
Appendix F – Weather Reports
Appendix G – SWPPP Training Log
Appendix H – Annual Reports & Numeric Action Level Exceedance Reports
Appendix I – Construction General Permit & Attachment D - Risk Level 1 Requirements
Appendix J – Caltrans Construction Site Best Management Practices (BMPs) Manual (applicable BMPs)
Appendix K – NOI Acknowledgement Letter from EPA/State
Appendix L – SWPPP Amendment Log
Appendix M – Additional Information (i.e., Delegation of Authority Form, Supporting Calculations, Endangered Species and Historic Preservation Documentation)

SECTION 1: SWPPP REQUIREMENTS

1.1 Introduction

This Stormwater Pollution Prevention Plan (SWPPP) is designed to comply with California's General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (General Permit) Order No. 2022-0057-DWQ (NPDES No. CAS000002) issued by the State Water Resources Control Board (State Water Board). In accordance with the General Permit, Section IV.O.2, this SWPPP is designed to address the following:

- Identification of all pollutants, their sources, and control mechanisms, including sources of sediment associated with all construction activities; (See SWPPP section 2.4, and Appendix A Table 4.2)
- Pollutant source assessments, including a list of potential pollutant sources and identification of site areas where additional BMPs are necessary to reduce or prevent pollutants in stormwater and authorized non-stormwater discharges; (See SWPPP sections 3, 4, and 5)
- Description of site-specific BMPs implemented to reduce or eliminate stormwater pollution; (See SWPPP sections 3, 4, and 5, and as required General Permit Attachment D, E, E.1 of F, D.2 of G, H, and J)
- Site-specific BMPS initialized immediately to temporarily stabilize an area disturbed by construction where construction activities will not be resumed within 14 days; (See SWPPP section 5.3)
- Identification, elimination, control, or treatment information for all non-stormwater discharges from the site not regulated by this or another NPDES permit; (See SWPPP section 4)
- Description of efforts and BMPs used to minimize and control pollutants discharged from equipment and vehicle washing, wheel wash water, and other wash waters. Wash waters must be captured and properly disposed of and/or treated to mitigate impacts to water quality; (See SWPPP sections 3.1.2, 3.2, and 4)
- Description of efforts and BMPs used to minimize exposure of building materials, building products, construction wastes, trash, landscape materials, fertilizers, pesticides, herbicides, detergents, sanitary waste, and other materials present on the site to precipitation and to stormwater; (See SWPPP section 3)
- Description of spill and leak prevention and response plan; (See SWPPP section 3.1)
- Construction Site Monitoring Program that describes methods and procedures for monitoring discharges in accordance with the applicable Attachment D or E; (see SWPPP sections 6.3 and Appendix A)
- Pre-Earthwork Drawing (See SWPPP Appendix C)
- Construction and Earthwork Drawing(s) (See SWPPP Appendix C)

1.2 Permit Registration Documents

Required Permit Registration Documents (PRDs) shall be submitted to the State Water Board via the Storm-water Multi Application and Report Tracking System (SMARTS) by the Legally Responsible Person (LRP), or authorized personnel (i.e., Approved Signatory) under the direction of the LRP. The project-specific PRDs include:

1. Notice of Intent (NOI);
2. Risk Assessment (Construction Site Sediment and Receiving Water Risk Determination);
3. Site Map;
4. Annual Fee;
5. Signed Certification Statement (LRP Certification is provided electronically with SMARTS PRD submittal);
6. SWPPP; and
7. Post-construction water balance calculation;

Site Maps can be found in Appendix C. A copy of the submitted PRDs shall also be kept in Appendix K along with the Waste Discharge Identification (WDID) confirmation.

1.3 SWPPP Availability and Implementation

The discharger shall make the SWPPP available at the construction site during working hours while construction is occurring and shall be made available upon request by a State or Municipal inspector. When the original SWPPP is retained by a crewmember in a construction vehicle and is not currently at the construction site, current copies of the BMPs and map/drawing will be left with the field crew and the original SWPPP shall be made available via a request by radio/telephone. The SWPPP shall be implemented concurrently with the start of ground disturbing activities.

1.4 SWPPP Amendments

The SWPPP should be revised when (per General Permit III.F):

- Update Construction Start and End Dates.
- Reduce Acreage.
- Termination of Programmatic Permit Coverage for Linear Underground and Overhead Projects.
- Increase Acreage.
- Change in Ownership.
- Deemed an Inactive Project (per General Permit III.G)

Additionally, the SWPPP shall be amended when:

- When deemed necessary by the QSD. The QSD has determined that the changes listed in Table 1.1 can be field determined by the QSP. All other changes shall be made by the QSD as formal amendments to the SWPPP.

The following items shall be included in each amendment:

- Who requested the amendment;
- The location of proposed change;
- The reason for change;
- The original BMP proposed, if any; and
- The new BMP proposed.

Amendment shall be logged at the front of the SWPPP, and certification kept in Appendix L. The SWPPP text shall be revised, replaced, and/or hand annotated as necessary to properly convey the amendment. SWPPP amendments must be made by a QSD. The following changes have been designated by the QSD as "to be field determined" and constitute minor changes that the QSP may implement based on field conditions, and do not require a SWPPP amendment. The SWPPP progress map shall be updated to reflect field changes.

Table 1.1 List of Changes to be Field Determined

Candidate changes for field location or determination by QSP⁽¹⁾	Check changes that can be field located or field determined by QSP
Increase quantity of an Erosion or Sediment Control Measure	X
Relocate/Add stockpiles or stored materials	X
Relocate or add toilets	X
Relocate vehicle storage and/or fueling locations	X
Relocate areas for waste storage	X
Relocate water storage and/or water transfer location	
Changes to access points (entrance/exits)	X
Change type of Erosion or Sediment Control Measure	
Changes to location of erosion or sediment control	
Minor changes to schedule or phases	X
Changes in construction materials	X
(1) Any field changes not identified for field location or field determination by QSP must be approved by QSD	

1.5 Retention of Records

The contractor must provide a copy of the SWPPP, all required PRDs, inspection reports, compliance certifications and annual reports, non-compliance reports, and training records to the LRP upon project completion. The LRP will retain this information for at least 3 years from the date that the site is finally

stabilized. The contractor must retain a copy of the SWPPP and inspection reports at the construction site from the date of project initiation to the date coverage under the General Permit are terminated. These records shall be available at the Site until construction is complete. Records assisting in the determination of compliance with the General Permit shall be made available within a reasonable time, to the Regional Water Board, State Water Board or U.S. Environmental Protection Agency (EPA) upon request. Requests by the Regional Water Board for retention of records for a period longer than three years shall be adhered to.

1.6 Required Non-Compliance Reporting

If a General Permit discharge violation occurs the QSP shall immediately notify the LRP. The LRP shall include information on the violation with the Annual Report. Corrective measures will be implemented immediately following identification of the discharge or written notice of noncompliance from the Regional Water Board. Discharges and corrective actions must be documented and include the following items:

- The date, time, location, nature of operation and type of unauthorized discharge.
- The cause or nature of the notice or order.
- The control measures (BMPs) deployed before the discharge event, or prior to receiving notice or order.
- The date of deployment and type of control measures (BMPs) deployed after the discharge event, or after receiving the notice or order, including additional measures installed or planned to reduce or prevent re-occurrence.

Reporting requirements for Numeric Action Levels (NALs) exceedances are discussed in Appendix A Section 4.6.

1.7 Annual Report

The General Permit requires all projects that are enrolled for more than one continuous three-month period to submit information and annually certify that their site is in compliance with these requirements. The primary purpose of this requirement is to provide information needed for overall program evaluation and public information.

An annual report, for the reporting year of July 1 – June 30, must be completed, by September 1 of each year until a NOT has been filed in the SWRCB's SMARTS database. The QSP is responsible for submitting the annual report information to the LRP by August 1 of each year. The LRP will review the report information for completeness and accuracy and upload the required information to the SWRCB's SMARTS database by September 1 of each year. Use the Annual Report form in Appendix H to prepare the Annual Report submittal to the LRP.

1.8 Changes to Permit Coverage

The General Permit allows for the reduction or increase of the total acreage covered under the General Permit when: a portion of the project is complete and/or conditions for termination of coverage have been met; when ownership of a portion of the project is purchased by a different entity; or when new acreage is added to the project.

Modified PRDs shall be filed electronically within 30 days of a reduction or increase in total disturbed area if a change in permit covered acreage is to be sought. The SWPPP shall be modified appropriately, shall be logged at the front of the SWPPP and certification of SWPPP amendments are to be kept in Appendix L. Updated PRDs submitted electronically via SMARTS can be found in Appendix L.

1.9 Notice of Termination

A Notice of Termination (NOT) must be submitted electronically by the LRP via SMARTS to terminate coverage under the General Permit. The NOT must include a final Site Map and representative photographs of the project site that demonstrate final stabilization has been achieved. The NOT shall be submitted within 90 days of completion of construction. The Regional Water Board will consider a construction site complete when the conditions of the General Permit, Section III.H have been met.

- The discharger has completed all construction activity.
- There is no greater potential for construction-related stormwater pollutants to be discharged into site runoff than prior to the construction activity.
- Construction-related equipment and temporary BMPs have been removed from the site, except as set forth in The General Permit Section III.F.2.b.
- Construction materials and waste have been disposed of properly.
- Soils disturbed by construction activities have been permanently stabilized (final stabilization), except as set forth in the General Permit Section III.F.2b, using materials that:
 - i. Have a product life that supports the full and continued stabilization of the site.
 - ii. Achieve stabilization without becoming trash or debris.
 - iii. Minimize the risk of wildlife entrapment.
- The discharger has ensured the QSP completed on-site visual inspections and verified the site complies with all Notice of Termination requirements, including installation of post-construction stormwater runoff BMPs and/or low impact development features.
- The Legally Responsible Person has submitted the information in the Notice of Termination has certified and submitted through SMARTS.
- The discharger has demonstrated that the site complies with all Notice of Termination conditions above (General Permit Section III.H) and all final stabilization conditions by one of the following methods:
 - i. 70 percent final cover method.
 - ii. Revised Universal Soil Loss Equation (RUSLE or RUSLE2) method.
 - iii. Custom method.

SECTION 2: SITE EVALUATION, ASSESSMENT, AND PLANNING

2.1 Project/Site Information

Project/Site Name: Sunrise Ranch Park

Project Street/Location: Manuel Court and Martin Street

City: Los Banos State: CA ZIP Code: 93635

County or Similar Subdivision: Merced County

Latitude/Longitude (Use **one** of three possible formats, and specify method)

Latitude:

1. __ ° __ ' __ " N (degrees, minutes, seconds)

2. __ ° __ . __ ' N (degrees, minutes, decimal)

3. 37 . 06461 ° N (decimal)

Longitude:

1. __ ° __ ' __ " W (degrees, minutes, seconds)

2. __ ° __ . __ ' W (degrees, minutes, decimal)

3. -120.82488 . ____ ° W (decimal)

Method for determining latitude/longitude:

☐ USGS topographic map (specify scale: _____)

☒ EPA Web site

☐ GPS

☐ Other (please specify): _____

Is the project located in Indian country? ☐ Yes ☒ No

If yes, name of Reservation, or if not part of a Reservation, indicate "not applicable." _____

Is this project considered a federal facility?

☐ Yes

☒ No

NPDES project or permit tracking number* (WDID#): 5F24C404519

*(This is the unique identifying number assigned to your project by your permitting authority after you have applied for coverage under the appropriate National Pollutant Discharge Elimination System (NPDES) construction general permit.)

2.1.1 Contact Information / Certification

Approved Signatory (if applicable):TBD

Insert Company or Organization Name

Insert Name

Insert Address

Insert City, State, Zip Code

Insert Telephone Number

Insert Fax/Email

See Appendix M for LRP authorization letter

Qualified SWPPP Practitioner (QSP): TBD

Insert Company or Organization Name
Insert Name, Cert. #
Insert Address
Insert City, State, Zip Code
Insert Telephone Number
Insert Fax/Email

SWPPP Installer Contact(s): TBD

Insert Company or Organization Name
Insert Name
Insert Address
Insert City, State, Zip Code
Insert Telephone Number
Insert Fax/Email
Insert area of control (if more than one operator at site)
Repeat as necessary

Project Manager(s) or Site Supervisor(s) directed by QSP: TBD

Insert Company or Organization Name
Insert Name
Insert Address
Insert City, State, Zip Code
Insert Telephone Number
Insert Fax/Email
Insert area of control (if more than one operator at site)
Repeat as necessary

Subcontractor(s) directed by QSP: TBD

Insert Company or Organization Name
Insert Name
Insert Address
Insert City, State, Zip Code
Insert Telephone Number
Insert Fax/Email
Repeat as necessary

Emergency 24-Hour Contact:

City of Los Banos
Charles Bergson
(209) 827-2466

2.1.2 Nature and Sequence of Construction Activity

Describe the general scope of the work for the project, major phases of construction, etc.:

Sunset Ranch Park is a 1.2-acre renovation project. Project will consist of three phases Grading and Demo, Utility and Landscaping. Landscape improvements will consist of new natural turf grass, planting of trees, shade sail structure over picnic area, walkways, play area, and half court basketball court.

What is the function of the construction activity?

☐ Residential ☐ Commercial ☐ Industrial ☐ Reconstruction
☐ Transportation ☐ Utility ☐ Linear Utility

☒ Other (please specify): Park

Estimated Project Start Date: 10/01/2024

Estimated Project Completion Date: 05/01/2025

2.1.3 Soils, Slopes, Vegetation, and Current Drainage Patterns

Sub-Surface Soil Conditions:

The Web Soil Survey shows 100% Woo clay Loam.

Slopes:

Site is relatively flat. Slopes are 0-2%.

Drainage Patterns:

Site is relatively flat. Drainage flows to the north toward Martin Street and into the Los Banos Storm drain system.

Vegetation:

Undeveloped land.

Known Pollution Sources:

No known toxic materials have been treated, stored, disposed, spilled, or leaked in significant quantities onto the construction site. Toxic materials includes toxic chemicals, listed in the Code of Federal Regulations (40 CFR 372), requiring reporting on EPA Form R; and no oil or hazardous substances in excess of reportable quantities, as specified in 40 CFR 110, 117, and 302.

2.1.4 Rainfall Erosivity Index

The Rainfall Erosivity Index (R) has been estimated using the NPDES Rainfall Erosivity Factor Calculator or Construction Erosivity Waiver Fact Sheet and based on the current schedule for final stabilization.

R factor: 21.35

2.2 Construction Site Risk Assessment

2.2.1 Sediment Risk Factor

The Sediment Risk Factor has been determined using the SMARTS method for the RUSLE equation.

Watershed Erosion Estimate ($R \times K \times LS$): 1.94 tons/acre

Site Sediment Risk Factor: Low

2.2.2 Receiving Water Risk Factor

The Receiving Water Risk Factor has been determined using the State Water Resource Control Board (SWRCB) High Receiving Water Risk Watershed GIS Methodology.

Description of storm drain system: City of Los Banos Storm Drain System

Description of receiving water: Arcadia Park Basin

Description of TMDLs or designated beneficial uses: Sediment

Receiving Water Risk Factor: Low

2.2.3 Project Risk Level

The Project Risk Level has been determined using the Combined Risk Level Matrix based on the site Sediment and Receiving Water Risk Factors.

Project Combined Risk: Level 1

2.3 Planning/Construction Activities

2.3.1 Construction Site & Schedule Estimates

The following are estimates of the construction site.

Total project area:	1.18± acres
Construction site area to be disturbed:	1.1± acres
Percentage impervious area before construction:	5.8%%
Runoff coefficient before construction:	.30
Percentage impervious area after construction:	24.1%%
Runoff coefficient after construction:	.39

The following are construction activity schedule estimates

Construction Start:	10/01/2024
Construction Finish:	05/01/2025
Rainy Season:	October 15 to April 1
Site Preparation (clearing and grubbing):	10/01/2024
Grading to begin:	10/15/2024

- Phase I
 - Grading and Land Development
 - Duration of phase (start, end date): 10/15/2024 - 02/28/2025.
 - BMPs associated with phase: NS-1, NS-6, NS-8, NS-10, SC-4, SC-5, SC-7, SS-1, SS-2, SS-4, SS-3, SS-7, TC-1, WE-1, WM-1, WM-2, WM-3, WM-4, WM-5, WM-6, WM-9, WM-10.
 - Stabilization methods for phase: Construction Entrance, Wet Suppression.
- Phase II
 - Streets and Utilities
 - Duration of phase (start, end date): N/A.
 - BMPs associated with phase: N/A.
 - Stabilization methods for phase: Construction Entrance, Concrete Washout, Wet Suppression.
- Phase III
 - Vertical Construction
 - Duration of phase (start, end date): N/A.
 - BMPs associated with phase: N/A.
 - Stabilization methods for phase: Concrete Washout, "Good Housekeeping".
- Phase IV
 - Final Landscaping and Site Stabilization
 - Duration of phase (start, end date): 03/01/2025 - 05/01/2025.
 - BMPs associated with phase: NS-1, NS-3, NS-6, NS-7, SC-4, SC-5, SC-7, SS-1, SS-2, SS-4, SS-7, WE-1, WM-1, WM-2, WM-3, WM-4, WM-5, WM-6, WM-9, WM-10. .
 - Stabilization methods for phase: Scheduling landscaping activities such that materials are not washed away by rain events, "Good Housekeeping".

2.4 Potential Construction Activity and Pollutant Sources

Section 3.4 includes a list of construction activities and associated materials that are anticipated to be used onsite. These activities and associated materials will or could potentially contribute pollutants, other than sediment, to storm-water runoff.

The anticipated activities and associated pollutants were used in Section 3.4 to select the Best Management Practices for the project. Location of anticipated pollutants and associated BMPs are shown on the Site Map in Appendix C or as necessary after the construction site is determined.

For sampling requirements for non-visible pollutants associated with construction activity please refer to Section 6.9 of Appendix A. For a full and complete list of onsite pollutants, refer to the Material Safety Data Sheets (MSDS), which are retained onsite at the construction trailer.

2.5 Identification of Non-Storm-water Discharges

Non-storm-water discharges consist of discharges, which do not originate from precipitation events. The General Permit provides allowances for specified non-storm-water discharges that do not cause erosion or carry other pollutants.

Per section IV.A of General Permit, Non-stormwater discharges from the following de-chlorinated potable and non-potable water sources are authorized if they comply with the requirements in Section IV.A.2 of the General Permit:

- a. Fire-fighting activity;
- b. Fire hydrant system flushing;
- c. Irrigation of vegetative erosion control measures;
- d. De-chlorinated potable water, including uncontaminated water line flushing;
- e. Hydrostatic pipe flushing and testing water;
- f. Air conditioning or compressor condensate;
- g. Uncontaminated groundwater or spring water from construction dewatering activities in compliance with Attachment J; and
- h. Water to control dust

The above non-stormwater discharges are authorized under the following conditions:

- a. The discharge is not routed through site areas with exposed soil, except for water used for dust control or to vegetation irrigation to stabilize areas;
- b. The discharge does not cause or contribute to an exceedance of water quality standards in the receiving water;
- c. The discharge complies with other applicable requirements of the General Permit including applicable action levels, effluent limitations, and monitoring and reporting requirements
- d. The discharge is not prohibited by an applicable regional or statewide water quality control plan;
- e. The discharge is in accordance with other applicable state and regional water board permits; and
- f. The discharge does not contain toxic constituents in toxic amounts and does not cause toxicity in the receiving water body.

These authorized non-storm-water discharges will be managed with the storm-water and non-storm-water BMPs described in Section 3 of this SWPPP and will be minimized by the QSP. Activities at this site that may result in unauthorized non-storm-water discharges include:

- Discharges to Areas of Special Biological Significance (ASBS) are prohibited by the California Ocean Plan, unless granted an exception issued by the State Water Board.
- Debris and trash, in accordance with State Water Board Resolution 2015-0019 Concrete work

- Treatment chemicals except as authorized in General Permit Attachment F and G
 - Wastewater from washout or cleanout of areas, structures or equipment with concrete, grout, stucco, paint, or other construction materials
 - Form-release oils and curing compounds
 - Fuels, oils, fluids, or other materials used in vehicle and equipment operation and maintenance
 - Soaps, solvents, or detergents
 - Toxic or hazardous substances (e.g., asbestos, lead, mercury, or PCBs)
- Steps will be taken, including the implementation of appropriate BMPs, to ensure that unauthorized discharges are eliminated, controlled, disposed, or treated on-site.

2.6 SWPPP Objectives

This SWPPP is designed to address the following objectives:

1. Potential pollutants and sources, including sources of sediment and associated with construction, construction site erosion and all other activities associated with construction activity are controlled;
2. Where not otherwise required to be under a Regional Water Board permit, all non-storm water discharges are identified and either eliminated, controlled, or treated;
3. Site BMPs are effective and result in the reduction or elimination of pollutants in storm water discharges and authorized non-storm water discharges from construction activity to the BAT/BCT standard;
4. Calculations and design details as well as BMP controls for site run-on are complete and correct, and
5. Stabilization BMPs installed to reduce or eliminate pollutants after construction is completed.

SECTION 3: GOOD HOUSEKEEPING BMPS

BMPs associated with this section:

- NS-10 Vehicle and Equipment Maintenance
- WM-1 Material Delivery and Storage
- WM-2 Material Use
- WM-3 Stockpile Management
- WM-4 Spill Prevention and Control
- WM-5 Solid Waste Management
- WM-6 Hazardous Waste Management
- WM-7 Contaminated Soil Management
- WM-8 Concrete Waste Management
- WM-9 Sanitary/Septic Waste Management
- WM-10 Liquid Waste Management
- WE-1 Wind Erosion Control

Discharger shall implement good site management (i.e., “housekeeping”) measures per the minimum requirements in Attachment D of the NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities Order No. 2022-0057-DWQ (General Permit). See Appendix I of this document for the General Permit Attachment D.

3.1 Material Handling and Waste Management

3.1.1 Spill Response and Implementation

Equipment and materials for cleanup of spills shall be available on site. Spills and leaks shall be cleaned up immediately and disposed of properly. Appropriate spill response personnel need to be assigned and trained.

Minor Spills

Minor spills typically involve small quantities of oil, gasoline, paint etc., which can be controlled by the first responder at the discovery of the spill. The practices commonly followed are to:

- **Contain the Spill**
 - Stop the source of the spill.
 - Berm around the spill area if necessary.
 - Use absorbent materials to prevent spreading of spill area if available.

- **Recover Spilled Materials**

- Sweep up spilled dry material immediately. Never attempt to “wash them away” with water or bury them.
- Recover liquid spills on dirt areas by digging up and properly disposing of contaminated soil.
- Recover liquid spills on paved or impermeable surfaces using “dry” cleanup methods (absorbent materials, cat litter, and/or rags).

- **Clean the Contaminated Area and/or Dispose of Contaminated Materials**

- Used cleanup rags may be hazardous waste that must either be sent to a certified industrial laundry or dry cleaner or disposed of properly.
- Dispose of contaminated materials in a proper waste container.
- Make sure that toxic liquid wastes (used oil, solvents, and paints) and chemicals (acid, pesticides, additives, and curing compounds) are not disposed of in dumpsters designed for construction materials.
- Place small non-hazardous spill residues and materials inside a sealed container and place into the garbage can or dumpster.
- Examine labels of spilled materials for proper waste disposal instructions.
- Inspect the spill area periodically until it can be satisfactorily determined that the spill material has been completely removed from the site.

Semi-Significant Spills

Semi-significant spills can be controlled by the first responder along with the aid of other personnel such as laborers, foremen, contractors, etc. This response may require the cessation of all other activities. The spill control measures taken should be consistent with those used for minor spills. In addition, the following actions should occur upon discovery of a semi-significant spill:

- **Contain the spread of the spill.**

- If the spill occurs on paved or impermeable surface, clean up using “dry” methods (absorbent materials, cat litter, and/or rags). Contain the spill by encircling with absorbent materials and do not let the spill spread widely.
- If the spill occurs in dirt areas, immediately contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soil.
- If the spill occurs during rain, cover the impacted areas, if possible, to avoid runoff and minimize the amount of material to be cleaned up.

Significant or Hazardous Spills

If a significant or hazardous spill cannot be completely controlled by on-site construction personnel should not attempt to initiate cleanup until appropriate and qualified staff have arrived at the site. The following steps shall be taken:

- **Notification**

If deemed necessary,

- Notify the local emergency response agency by dialing 911. Also notify other appropriate local officials. All necessary emergency telephone numbers should be available at the construction site.
- Notify the Governor's Office of Emergency Services Warning Center at (916) 845-8470 (Inland Region); (510) 286-0895 (Costal Region); (562) 795-2877 (Southern Region)
- Notify the National Response Center for spills of federal reportable quantities at (800) 424-8802.

Notify by telephone and followed up with a written report as soon as possible.

- Notify a spill cleanup contractor, or a Haz-Mat team should be contacted immediately.
- Notify other agencies which may need to be consulted include local fire, police, and public works departments, the Coast Guard, the Highway Patrol, the State Department of Toxic Substance Control, the California Division of Oil and Gas, Cal/OSHA, etc.

3.1.2 Waste Management & Materials Pollution Control BMPS

All waste management & materials pollution control BMPs shall be in accordance with Section 8 of Caltrans Construction Site BMPs Manual. See Appendix J of this document for BMPs WM-1 through WM-10, anticipated WM BMPs are described in this section.

BMP: WM-8 Concrete Waste Management	
BMP Description: Proper containment of concrete, portland cement concrete, and asphalt concrete is required to prevent storm water and watercourse contamination. PCC and AC shall be collected and properly disposed of or placed in concrete washout facilities. Designated containment or storage areas should be located away from vehicular traffic, preferably close to entrances and away from watercourses.	
Installation Schedule:	Phase 1 - beginning of construction.
Inspection:	Inspect designated containment/storage areas on a regular basis. Monitor concrete working tasks, such as saw cutting, coring, grinding, and grooving daily. Temporary concrete washouts shall provide adequate freeboard.
Maintenance/Repair:	Containment liners, covers, sand bags, and structures shall be repaired or replaced as needed. Areas should be kept clean and well organized.

3.2 Vehicle Storage and Maintenance

BMP: NS-10 Vehicle and Equipment Maintenance	
BMP Description: Best practice is to store vehicles and perform maintenance off-site. When on-site maintenance is required, do so in dedicated maintenance areas protected from storm water run-on and runoff, a minimum of 50 ft from downstream drainage facilities and watercourses. Maintenance areas shall be equipped with spill kit (clean up materials) and/or spill protection devices.	
Installation Schedule:	Phase 1 - beginning of construction.
Inspection:	Inspect vehicles each day of use. Inspect designated storage/maintenance areas on a regular basis.
Maintenance/Repair:	Leaks shall be repaired immediately, or vehicle will be removed from construction site. Inspect all equipment for damaged hose and leaky gaskets, repair as needed.

BMP: Intentionally Left Blank	
BMP Description:	
Installation Schedule:	
Inspection:	
Maintenance/Repair:	

3.3 Landscape Materials

BMP: WM-1 Material Delivery and Storage	
BMP Description: Proper containment of landscape materials such as fertilizers, and pesticides includes a hard cover roof and side protection. Designated containment or storage areas should be located away from vehicular traffic, preferably close to entrances and away from watercourses. Material Safety Data Sheets shall be kept in the storage area for all stored materials.	
Installation Schedule:	Phase 4 - beginning of landscape and/or final stabilization.
Inspection:	Inspect storage areas weekly.
Maintenance/Repair:	Containment liners, covers, and structures shall be repaired or replaced as needed. Areas should be kept clean and well organized.

3.4 Potential Pollutant Sources

Potential pollutants and sources, other than sediment, to storm water runoff to be controlled:

Trade Name Material	Storm Water Pollutants	Location
Vehicles	Oil, grease, petroleum, coolants	all areas requiring vehicular equipment
Asphalt-concrete operations	asphaltic emulsions, base and sub-base material	all locations requiring a/c pavement, overlays, or surface treatment
Concrete curing	curing compounds	all concrete paths, walkways and hardscapes
Landscaping	fertilizer, pesticides	landscape areas
Painting	paints & primers	

3.5 Air Deposition Control

BMP: WE-1 Wet Suppression (Watering)	
BMP Description: Applying water and/or other dust palliatives as necessary to prevent or alleviate dust from being dispersed into the air.	
Installation Schedule:	Phase 1 - As needed for exposed soil areas.
Inspection:	Frequently, or possibly multiple times per day, inspect site conditions of disturbed or exposed areas subject to traffic, demolition, clearing and excavation. If watering is not conveyed by use of pipeline, at least one mobile unit shall be available for watering uses at all times.
Maintenance/Repair:	Repair all leaks and damage to watering equipment as needed. Regularly service watering equipment for efficient performance.

BMP: WM-5 Solid Waste Management	
BMP Description: Designated waste collection areas and containers with lids help prevent the potential discharge of pollutants in the storm water runoff and manage unpleasant odors.	
Installation Schedule:	Phase 1 – Prior to construction activities resulting in waste.
Inspection:	Inspect construction waste areas weekly and arrange for regular waste collection. Ensure that containers are watertight and there are no leaks or spills in the vicinity. Verify that waste containers are located under a cover area or have adequate lids to cover waste.
Maintenance/Repair:	Fix or replace trash containers/receptacles with holes, and properly dispose of collected waste once containers are full.

BMP: WM-3 Stockpile Management	
BMP Description: Reduce or eliminate air pollution from stockpiles of soil and other construction materials. Provide protective cover and a temporary perimeter sediment barrier if applicable for inactive stockpiled material and forecasted rain and wind conditions.	
Installation Schedule:	Phase 1 – Prior to construction activities.
Inspection:	Inspect stockpiles and temporary controls daily. Arrange for proper removal or distribution of stockpile material.
Maintenance/Repair:	Repair or replace covers and perimeter controls as needed for efficient performance.

BMP: SS-7 Geotextiles, Mats, Plastic Covers, and Erosion Control Blankets	
BMP Description: Involves the placement of geotextiles, mats, plastic covers, or erosion control blankets to stabilized disturbed soil areas and protect soils from erosion by wind or water.	
Installation Schedule:	Phase 1 - Prior to construction activities.
Inspection:	Inspect BMPs prior to forecasted rain, daily during extended rain events, after rain events, weekly during the rainy season and at two week intervals during the non-rainy season.

Maintenance/Repair:	Areas where erosion is evident shall be repaired and BMPs reapplied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area will require reapplications of BMPs.

SECTION 4: NON-STORM WATER MANAGEMENT

BMPs associated with this section:

- NS-1 Water Conservation Practices
- NS-3 Paving and Grinding Operations
- NS-8 Vehicle and Equipment Cleaning
- NS-12 Concrete Curing
- NS-14 Concrete Finishing
- SC-7 Street Sweeping and Vacuuming

Discharger shall implement non-storm water management measures per the minimum requirements in Attachment D of the NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities Order No. 2022-0057-DWQ (General Permit). See Appendix I of this document for the General Permit Attachment D.

4.1 Non-Storm Water Controls

BMP: NS-1 Water Conservation Practices	
BMP Description: Activities that use water during construction in a way that avoids causing erosion and discharge of pollutants.	
Installation Schedule:	Phase 1 - Practices implemented at beginning of construction.
Inspection:	Verify BMPs are in place prior to commencement of authorized non-storm water discharges and inspect daily during discharges.
Maintenance/Repair:	Frequently check all water equipment to prevent unintended discharges as needed.

BMP: NS-3 Paving and Grinding Operations	
BMP Description: Procedures and practices for conducting paving, saw cutting, and grinding operations to minimize the transport of pollutants to the storm drain system.	
Installation Schedule:	Phase 2 - Streets and utilities.
Inspection:	Regularly inspect paving equipment, each day of use.
Maintenance/Repair:	Repair equipment leaks and drips as needed, ensure all operators are implementing appropriate procedures during paving operations.

BMP: NS-12 Concrete Curing	
BMP Description: Concrete curing includes the use of both chemical and water methods. Proper procedures minimize pollution of runoff during concrete curing by diversion or containment.	
Installation Schedule:	Phase 3 - Vertical Construction and PCC installment.
Inspection:	Inspect active areas during curing operations, check any temporary diversion devices, lined channels, or swales for washouts, erosion, or debris.
Maintenance/Repair:	Inspect cure containers and spraying equipment for leaks. Repair torn lining, and remove debris from temporary channels as necessary.

BMP: NS-14 Concrete Finishing	
BMP Description: Methods include sand blasting, shot blasting, grinding, or high pressure water blasting. Proper procedures minimize the impact that concrete finishing methods such as sand blasting, grinding, or high pressure water blasting may have on runoff.	
Installation Schedule:	Phase 3 - Vertical Construction and PCC installment.
Inspection:	If containment structures are used, inspections should be done prior to concrete finishing operations each day of use. Inspect areas after each work shift for liquid or solid waste.
Maintenance/Repair:	Repair voids or damages to containment structures. Remove and contain liquid or solid waste from construction area.

4.2 Vehicle and Equipment Cleaning

BMP: NS-8 Vehicle and Equipment Cleaning	
BMP Description: Cleaning procedures that reduce or eliminate the discharge of pollutants. Using offsite cleaning locations, washing in designated contained areas, and infiltrating the wash water are some examples of BMPs.	
Installation Schedule:	Phase 1 - Practices, and designated areas installed prior to commencement of construction.
Inspection:	Verify BMPs are in place weekly, and daily during non-storm water discharges.
Maintenance/Repair:	Repair berm to ensure designated cleaning area is contained. Remove liquids and sediment from sump as needed.

4.3 Street Cleaning

Dischargers shall clean streets in accordance with BMP SC-7 while preventing any unauthorized non-storm water discharges from reaching surface water or municipal separated storm sewer systems (MS4).

BMP: SC-7 Street Sweeping and Vacuuming	
BMP Description: All sediment or other construction activity related materials that are deposited on all immediate access roads shall be removed by vacuuming or sweeping.	
Installation Schedule:	Phase 1 - Practices implemented at beginning of construction.
Inspection:	Daily and prior to rain events.
Maintenance/Repair:	Maintain proper vacuuming or sweeping equipment for usage.

SECTION 5: EROSION AND SEDIMENT CONTROL BMPS

BMPs associated with this section:

- SS-2 Preservation of Existing Vegetation
- SS-4 Hydroseeding
- SS-7 Geotextiles, Plastic Covers & Erosion Control Blankets/Mats
- SS-9 Earth Dikes/Drainage Swales & Lined Ditches
- SC-1 Silt Fence
- SC-4 Check Dam
- SC-5 Fiber Rolls
- SC-7 Street Sweeping & Vacuuming
- SC-10 Storm Drain Inlet Protection
- WE-1 Wind Erosion Control
- TC-1 Stabilized Construction Entrance/Exit

5.1 Minimize Disturbed Area and Protect Natural Features and Soil

BMP: SS-2 Preservation of Existing Vegetation	
BMP Description: Planned preservation of existing vegetation or specific features to minimize the potential of removing or injuring existing trees, vines, shrubs, and grasses that protect soil from erosion.	
Installation Schedule:	Phase 1 - Practices implemented prior to land disturbance.
Inspection:	Verify protective measures are in place (orange caution signs, tape, etc.) as needed.
Maintenance/Repair:	Replace or repair damaged protection measures immediately.

5.2 Wind Erosion Control

BMP: WE-1 Wet Suppression (Watering)	
BMP Description: Applying water and/or other dust palliatives as necessary to prevent or alleviate erosion from the forces of wind.	
Installation Schedule:	Phase 1 - As needed for exposed soil areas.
Inspection:	Frequently, or possibly multiple times per day, inspect site conditions of disturbed or exposed areas subject to traffic, demolition, clearing and excavation. If watering is not conveyed by use of pipeline, at least one mobile unit shall be available for watering uses at all times.
Maintenance/Repair:	Repair all leaks and damage to watering equipment as needed. Regularly service watering equipment for efficient performance.

BMP: WE-1 Onsite Traffic Control	
BMP Description: Onsite Traffic Control	
Installation Schedule:	Phase 1 - Prior to commencement of heavy traffic usage.
Inspection:	Ensure signs limiting onsite vehicle traffic to less than 15 mph are maintained and visible upon entering the construction site. Observe traffic patterns daily and ensure maximum usage of stabilized roadways onsite. Inspect temporary construction entrances daily for proper coverage.
Maintenance/Repair:	Fix or replace signs as needed. Repair temporary construction entrances as needed.

BMP: SS-7 Geotextiles, Mats, Plastic Covers, and Erosion Control Blankets	
BMP Description: Involves the placement of geotextiles, mats, plastic covers, or erosion control blankets to stabilize disturbed soil areas and protect soils from erosion by wind or water.	
Installation Schedule:	Phase 1 – As needed for exposed soil areas.
Inspection:	Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season and at two week intervals during the non-rainy season.
Maintenance/Repair:	Areas where erosion is evident shall be repaired and BMP's reapplied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area will require reapplication of BMP's.

BMP: Intentionally Left Blank	
BMP Description:	
Installation Schedule:	
Inspection:	
Maintenance/Repair:	

5.3 Effective Soil Cover

If necessary the following measures may be useful to implement. There are no extreme slopes or long periods of exposed soils that would require the use of temporary soil cover. Final landscaping will provide the effective soil cover for this project.

BMP: SS-4 Hydroseeding	
BMP Description: Hydroseeding is applied on disturbed soil areas requiring temporary protection until permanent vegetation is established or disturbed soil areas that must be re-disturbed following an extended period of inactivity (14 days or more).	
☐ Permanent ☐ Temporary	
Installation Schedule:	Phase 1 - As needed after construction activities leave soil exposed prior to final stabilization.
Inspection:	After any rainfall event, the Contractor is responsible for maintaining all slopes to prevent erosion. All seeded areas shall be inspected for failures.
Maintenance/Repair:	Inadequate areas shall be re-seeded, fertilized, and mulched within the planting season, using not less than half the original application rates.

BMP: SS-7 Geotextiles, Mats, Plastic Covers, and Erosion Control Blankets	
BMP Description: Involves the placement of geotextiles, mats, plastic covers, or erosion control blankets to stabilize disturbed soil areas and protect soils from erosion by wind or water.	
☐ Permanent ☐ Temporary	
Installation Schedule:	Phase 1 – As needed for exposed soil areas.
Inspection:	Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season and at two week intervals during the non-rainy season.
Maintenance/Repair:	Areas where erosion is evident shall be repaired and BMP's reapplied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area will require reapplication of BMP's.

BMP: Intentionally Left Blank	
BMP Description:	
☐ Permanent ☐ Temporary	
Installation Schedule:	
Inspection:	
Maintenance/Repair:	

5.4 Perimeter Controls

BMP: SC-7 Access Roads Vacuuming or Sweeping	
BMP Description: All sediment or other construction activity related materials that are deposited on all immediate access roads shall be removed by vacuuming or sweeping.	
Installation Schedule:	Phase 1 - Practices implemented at beginning of construction.
Inspection:	Daily and prior to rain events.
Maintenance/Repair:	Maintain proper vacuuming or sweeping equipment for usage.

BMP: TC-1 Stabilized Construction Entrance/Exit	
BMP Description: A stabilized construction access is defined by a point of entrance/exit to a construction site that is stabilized to reduce the tracking of mud and dirt onto public roads by construction vehicles.	
Installation Schedule:	Phase 1 - Implemented at beginning of construction.
Inspection:	Inspect routinely for damage and assess effectiveness of the BMP.
Maintenance/Repair:	Remove aggregate, separate and remove sediment if entrance/exit is clogged.

BMP: Intentionally Left Blank	
BMP Description:	
Installation Schedule:	
Inspection:	
Maintenance/Repair:	

BMP: Intentionally Left Blank	
BMP Description:	
Installation Schedule:	
Inspection:	
Maintenance/Repair:	

5.5 Linear Sediment Controls

BMP: SC-1 Silt Fence	
BMP Description: A silt fence is a temporary linear sediment barrier of permeable fabric designed to intercept and slow the flow of sediment-laden sheet flow runoff. Silt fences allow sediment to settle from runoff before water leaves the construction site.	
Installation Schedule:	Phase 1 - Installed when needed after soil is disturbed.
Inspection:	Inspect weekly.
Maintenance/Repair:	Maintain silt fences to provide an adequate sediment holding capacity. Sediment shall be removed when the sediment accumulation reaches one-third (1/3) of the barrier height. Repair or replace silt fences that are undercut, split, torn, slumping, or weathered.

BMP: SC-4 Check Dam	
BMP Description: Gravel bags used as a small barrier across constructed swale, drainage ditch, or gutter. Check dams reduce the velocity of flowing water, allowing sediment to settle out of discharge before entering storm drainage system.	
Installation Schedule:	Phase 1 - Installed prior to land disturbance.
Inspection:	Inspect weekly.
Maintenance/Repair:	Maintain all components of the check dam to ensure proper performance. Repair or replace gravel bags that are torn, split, undercut, or weathered. Clean all debris and trash trapped by check dam.

BMP: SC-5 Fiber Rolls	
BMP Description: Tubular roll placed along the toe of the slope, face of the slope, and at grade breaks of exposed slopes to comply with Table 1 of Attachment D of General Permit.	
Installation Schedule:	Phase 1 - Installed when needed after soil is disturbed.
Inspection:	Inspect weekly.
Maintenance/Repair:	Repair or replace sections of fiber rolls that are torn, split, unraveled, or slumping.

BMP: Intentionally Left Blank	
BMP Description:	
Installation Schedule:	
Inspection:	
Maintenance/Repair:	

5.6 Drain Inlet Protection

BMP: SC-10 Drain Inlet Protection	
BMP Description: Devices used at storm drain inlets that are subject to runoff from construction activities to detain and/or to filter sediment-laden runoff to allow sediment to settle and/or to filter sediment prior to discharge into the storm drainage system.	
Installation Schedule:	Phase 1 - Installed prior to land disturbance.
Inspection:	Inspect weekly.
Maintenance/Repair:	Maintain all components of the drain inlet protection device to ensure proper performance. Temporarily remove the device to clean around the inlet and the surrounding area. Repair or replace components of the device that are torn, split, undercut, or weathered.

BMP: Intentionally Left Blank	
BMP Description:	
Installation Schedule:	
Inspection:	
Maintenance/Repair:	

5.7 Run-on and Run-off Controls

BMP: SS-9 Earth Dikes and Drainage Swales	
BMP Description: Used to channel run-on from adjacent sites away from all disturbed areas.	
Installation Schedule:	Phase 1 – Installed as needed around areas being disturbed or left exposed.
Inspection:	Inspect weekly.
Maintenance/Repair:	Replace lost riprap, damaged linings or soil stabilizers as needed. Remove debris and sediment, and repair linings and embankments as needed.

BMP: SC-1 Silt Fence	
BMP Description: A silt fence is a temporary linear sediment barrier of permeable fabric designed to intercept and slow the flow of sediment-laden sheet flow runoff. Silt fences allow sediment to settle from runoff before water leaves the construction site.	
Installation Schedule:	Phase 1 - Installed when needed after soil is disturbed.
Inspection:	Inspect weekly.
Maintenance/Repair:	Maintain silt fences to provide an adequate sediment holding capacity. Sediment shall be removed when the sediment accumulation reaches one-third (1/3) of the barrier height. Repair or replace silt fences that are undercut, split, torn, slumping, or weathered.

BMP: SC-5 Fiber Rolls	
BMP Description: Tubular roll placed along the toe of the slope, face of the slope, and at the grade breaks of exposed slopes to comply with Table 1 of attachment D of General Permit.	
Installation Schedule:	Phase 1 - Installed when needed after soil is disturbed.
Inspection:	Inspect weekly.
Maintenance/Repair:	Repair or replace sections of fiber rolls that are torn, split, unraveled, or slumping.

BMP: Intentionally Left Blank	
BMP Description:	
Installation Schedule:	
Inspection:	
Maintenance/Repair:	

5.8 Additional BMPs

BMP: Intentionally Left Blank	
BMP Description:	
Installation Schedule:	
Inspection:	
Maintenance/Repair:	

BMP: Intentionally Left Blank	
BMP Description:	
Installation Schedule:	
Inspection:	
Maintenance/Repair:	

BMP: Intentionally Left Blank	
BMP Description:	
Installation Schedule:	
Inspection:	
Maintenance/Repair:	

SECTION 6: SWPPP IMPLEMENTATION

The Discharger shall make the SWPPP available at the construction site during working hours while construction is occurring and shall be made available upon request by a State or Municipal inspector. When the original SWPPP is retained by a crewmember in a construction vehicle and is not currently at the construction site, current copies of the BMPs and map/drawing will be left with the field crew and the original SWPPP shall be made available via a request by radio/telephone.

The Discharger shall ensure that all inspection, maintenance repair and sampling activities at the project location shall be performed or supervised by a Qualified SWPPP Practitioner (QSP) representing the discharger. The QSP may delegate any or all of these activities to an employee appropriately trained to do the task(s). All amendments to this SWPPP must be completed by a Qualified SWPPP Developer (QSD) and logged in this document. QSD and QSP qualification requirements are found in section VII of the General Permit.

6.1 Training

The discharger shall ensure that all staff responsible for implementing requirements of this SWPPP and the General Permit shall be appropriately trained in accordance with Section VII of the General Permit. Training should be both formal and informal, occur on an ongoing basis when it is appropriate and convenient, and should include training/workshops offered by the State Water Resource Control Board (SWRCB), Regional Water Quality Control Board (RWQCB), or other locally recognized agencies or professional organizations. Copies of the SWPPP and/or plans shall be distributed or readily available to the employees who will be working on the project.

Documentation of all training for persons responsible for implementing the requirements of the General Permit shall be included in the Annual Reports. The Storm Water Pollution Training Log is found in Appendix G.

6.2 Inspection, Maintenance and Repair

Discharger shall perform weekly inspection and observations, and at least once each 24-hour period during extended storm events, to identify and record BMPs that need maintenance to operate effectively, that have failed, or that could fail to operate as intended. Inspectors shall be the QSP or be trained by the QSP.

The QSD must perform visual inspections:

- a. Within 30 days of construction activities commencing on a site;
- b. Within 30 days of a discharger replacing the QSD;
- c. Once August through October;
- d. Once January through March;
- e. Within 14 calendar days after a numeric action level exceedance; and
- f. Within the time period requested in writing from Water Board staff.

The QSP must perform visual inspections:

- a. Once every calendar month;
- b. Within 72 hours prior to a forecasted Qualifying Precipitation event to inspect areas of concern to verify the status of any deficiencies, BMPs, or other identified issues at the site. If extended forecast precipitation data (great than 72 hours) is available from the National Weather Service, the pre-precipitation event inspection may be done up to 120 hours in advance;
- c. Within 14 days after a numeric action level exceedance the QSP shall visually inspect the drainage area of exceedance and document any areas of concern; and
- d. Prior to the submittal of General Permit Notice of Termination or Change or Information (for acreage changes) of all or part of a site.
- g. complete visual inspections within 30 days of construction activities commencing on a site, within 30 days of a discharger replacing the QSD, once August through October, once January through March, within 14 calendar days after a numeric action level exceedance, and within the time period requested in writing from the Water Board staff.

Upon identifying failures or other shortcomings, as directed by the QSP, discharger shall begin repairs or design changes to BMPs within 72 hours and complete the changes as soon as possible.

The BMP Inspection Checklist is found in Appendix D of this document.

6.3 Construction Site Monitoring

Discharger is subject to the Risk Level 1 monitoring and reporting requirements found in Section III of Attachment D of the General Permit. The Construction Site Monitoring Plan (CSMP) for this project is found in Appendix A of this SWPPP document and shall be implemented for the forecasted rain event with a 50% or greater chance of 0.5 inches or more in a 24-hour period. Precipitation forecast information shall be obtained from the National Weather Service Forecast Office. Stored or contained storm water that will likely discharge after operating hours due to anticipated precipitation shall be observed prior to the discharge during operating hours. If the discharger decides to use a watershed monitoring option or a particle size analysis for project risk justification, the standards set in the General Permit shall apply.

SECTION 7: POST CONSTRUCTION STORM WATER MANAGEMENT

Post-construction storm water management refers to control measures taken to prevent storm water pollution associated with post-construction activities at a developed site. Post-construction storm water management controls may be site planning controls, which are measures taken during project planning and design to minimize post-development increases in run-off volume and peak rate, and to prevent the contact of pollutants with storm water; or pollutant removal controls, which are devices designed to remove pollutants from storm water runoff. All post-construction storm water management controls at the project site have been designed in accordance with local public agency guidelines and standards. City of Los Banos will be the local governmental agency that will coordinate the downstream water quality with the Regional Water Quality Control Board (if applicable).

7.1 Post Construction Standards (as stated in General Permit)

Discharger is located within an area subject to post-construction standards of an active Phase I or II MS4

7.2 Final Stabilization

Disturbed public and private open space shall be stabilized in accordance with the approved plans and applicable permits. All improvements are to be maintained by either City of Los Banos or the property owner as applicable to ownership.

All storm water inlets will be stenciled with the “No Dumping” legends specified by the local Non-point Source Pollution Control Program.

Landscape features incorporated in the right of way should be designed to minimize pollutants discharges, including any sediment from the site after construction has been complete. These features are to be maintained by City of Los Banos, the Developer or individual property owner pursuant to the requirements of the project.

Post Construction Site Design BMP Descriptions

Minimizing Impervious Areas
☐ Reduce sidewalk widths ☐ Incorporate landscaped buffer areas between sidewalks and streets ☐ Reduce overall lot imperviousness by adding landscaping, thereby increasing the pervious area.
Increase Rainfall Infiltration
☐ Use permeable materials for private sidewalks, driveways, parking lots, and interior roadway surfaces (examples: hybrid lots, parking groves, permeable overflow parking, etc.). ☐ Direct rooftop runoff to pervious areas such as yards, open channels, or vegetated areas, and avoid routing rooftop runoff to the roadway or the urban runoff conveyance system.

Maximize Rainfall Interception

- ☐ Plant interception trees that reduce storm-water run-off and pollution discharge, as documented in the volume retention and tributary impervious area credit calculations.
- ☐ Incorporate shared root space to increase tree life expectancy.
- ☐ Impose limitations on heavy equipment usage.
- ☐ Select drought-tolerant plant species.

Minimize Directly Connected Impervious Areas (DCIAs)

- ☐ Drain rooftops into adjacent landscaping prior to discharging to the storm drain.
- ☐ Drain parking lots into landscape areas co-designed as biofiltration areas.
- ☐ Drain roads, sidewalks, and impervious trails into adjacent landscaping.

Maximize Rainfall Interception

- ☐ Cisterns.
- ☐ Foundation planting

The following source control post-construction BMPs to comply with General Permit Section XIII.B and local requirements have been identified for the site:

Post Construction Source Control BMPs

☐ Storm drain system stenciling and signage: “Only rain down the drain” placards.
☐ Outdoor material and trash storage area designed to reduce or control rainfall runoff.
☐ Landscape Irrigation Controls. q Street Sweeping and Catch Basin Cleaning.
Public Education
☐ Training for building owners/managers
☐ Good housekeeping practices (proper waste disposal, etc.).
☐ Hazardous Waste Collection.
☐ Landscape Irrigation Controls.
☐ Reduction of Vehicle Use Impacts.
☐ Storage and Application of Fertilizers, Pesticides and Other Landscape Management Products.

SECTION 8: CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. I am also aware that my user ID and password constitute my electronic signature and any information I indicate I am electronically certifying contains my signature. I understand that my electronic signature is the legal equivalent of my handwritten signature. My signature on this form certifies that my electronic signature is for my own use, that I will keep it confidential, and that I will not delegate or share it with any other person. Should I wish to delegate such authority, I will do so formally in writing and electronically notify the State Water Board using SMARTS of such delegation within 10 days of delegation. I further certify that I will protect my electronic signature from unauthorized use, and that I will contact the State Water Board, within two business days of discovery, if I suspect that my electronic signature has been lost, stolen, or otherwise compromised."


Legally Responsible Person's Signature

07/11/24
Date

Charles Bergson, Public Works Director/City Engineer

Legally Responsible Person's Name and Title

209-827-2466

Telephone Number

SECTION 9: REFERENCES

The following documents are made part of this SWPPP by reference:

- National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities Order No. 2022-0057-DWQ NPDES No. CAS000002 adopted September 8, 2022
- Construction General Permit Fact Sheet September 8, 2022
- Caltrans Storm Water Quality Handbooks Construction Site Best Management Practices (BMPs) Manual May 2017
- Improvement Plans

SWPPP APPENDICES

Attach the following documentation to the SWPPP:

Appendix A – Construction Site Monitoring Plan

Appendix B – General Location Map

Appendix C – Site Maps

Appendix D – BMP Inspection Checklist

**Appendix E – Qualifying Rain Event Forecasts, Inspections,
Chain of Custody, and Monitoring Forms**

Appendix F – Weather Report & Rain Gauge

Appendix G – SWPPP Training Log

**Appendix H – Annual Reports & Numeric Action Level
Exceedance Reports**

**Appendix I – Construction General Permit & Attachment D – Risk
Level 1 Requirements**

**Appendix J – Caltrans Construction Site Best Management
Practices (BMPs) Manual (applicable BMPs)**

Appendix K – NOI Acknowledgement Letter from EPA/State

Appendix L – SWPPP Amendment Log

**Appendix M – Additional Information if Applicable (i.e.,
Delegation of Authority Form, Supporting
Calculations, Endangered Species and Historic
Preservation Documentation)**

APPENDIX A

CONSTRUCTION SITE MONITORING PLAN

Appendix A – Construction Site Monitoring Program (CSMP)

1. General Requirements (Per General Permit Attachment D section III)

The monitoring requirements of this section are issued pursuant to Water Code 13383 and specifies monitoring requirements for discharges subject to this Order.

All dischargers shall implement the CSMP in compliance with the General Permit to accomplish the following:

- a. To demonstrate that the site is in compliance with the Discharge Prohibitions of the Construction General Permit;
- b. To determine whether non-visible pollutants are present at the construction site and are causing or contributing to exceedances of water quality objectives;
- c. To determine whether immediate corrective actions, additional Best Management Practices (BMP) implementation, or SWPPP revisions are necessary to reduce pollutants in stormwater discharges and authorized non-stormwater discharges;
- d. To determine whether BMPs included in the SWPPP and REAP are effective in preventing or reducing pollutants in storm-water discharges and authorized non-storm-water discharges.

2. Monitoring Exceptions

Dischargers are not required to physically conduct visual inspections or collect samples under the following conditions:

- a. During dangerous weather conditions such as electrical storms, flooding, and high winds above 40 miles per hour;
- b. Outside of scheduled site operation hours; or
- c. When the site is not accessible to personnel.

For inactive projects, dischargers may reduce the visual inspection frequency and suspend sampling per Section III.G of the Order. Dischargers shall provide an explanation with supporting information for all missed visual inspections or sampling required by this Attachment, to be included in the Annual Report.

3. Visual Inspection Requirements

Risk Level 1 required visual inspections: Weekly, Pre-Qualifying Precipitation Event, During Qualifying Precipitation Event, and Post-Qualifying Precipitation Event.

A pre-, during, or post-qualifying precipitation event inspection also satisfies the weekly visual inspection requirement.

Dischargers shall have a QSP conduct a pre-Qualifying Precipitation Event inspection within 72 hours prior to any weather pattern that is forecasted to have a 50 percent or greater chance of 0.5 inches or more in a 24-hour period. Precipitation forecast information shall be obtained from the National Weather Service Forecast Office and shall be included as part of the inspection checklist weather information. If extended forecast precipitation data (greater than three days) is available from the national Weather Service, the pre-precipitation event inspection may be done up to 120 hours in advance. The pre-Qualifying Precipitation Event inspection shall include an inspection of the following:

- a. All stormwater drainage areas to identify leaks, spills, or uncontrolled pollutant sources and when necessary, implement appropriate corrective actions to control pollutant sources.
- b. All BMPs to identify whether they have been implemented in accordance with the SWPPP, and when necessary, implement appropriate corrective actions to control pollutant sources.
- c. All stormwater storage and containment areas to detect leaks and check for available capacity to prevent overflow.

Dischargers shall conduct visual inspections at least once every 24-hour period during Qualifying Precipitation Events. Qualifying Rain Events are extended for each subsequent 24-hour period forecast to have at least 0.25 inches of precipitation.

Discharges shall conduct post-qualifying Precipitation Event visual inspections within 96 hours after each Qualifying Precipitation Event if 0.5 inches or more precipitation is measured during the duration of the Qualifying Precipitation Event using the onsite rain gauge. The inspection is to:

- a. Identify if BMPs were adequately designed, implanted, and effective;
- b. Identify BMPs that require repair or replacement due to damage; and
- c. Identify additional BMPs that need to be implemented and revise the SWPPP accordingly.

Dischargers shall conduct visual inspections during scheduled site operating hours.

For each required inspection, dischargers shall develop and complete an inspection checklist (see SWPPP Appendix D & E) that, at a minimum includes:

- a. Inspection type (weekly, pre-precipitation, daily, precipitation or post-precipitation event);
- b. Inspection date and time the inspection was conducted;
- c. Weather information, including the presence or absence of precipitation, an estimate of the beginning of the Qualifying Precipitation Event, duration of the event, date of the end of the Qualifying Precipitation Event, and the amount of precipitation in inches;
- d. Site information, including stage of construction, activities completed since last inspection, and approximate area of the site exposed;
- e. A description of any BMPs evaluated and any deficiencies noted, including those that may have resulted in the release of non-visible pollutant;
- f. A list of BMPs inspected, including erosion controls, sediment controls, chemical and waste controls, and non-stormwater controls;
- g. Report of the presence of any floating and suspended materials, odors, discolorations, visible sheens, and any sources of pollutants in discharges and contained stormwater;
- h. Any corrective actions required, including any necessary changes to the SWPPP and the associated implementation dates;
- i. Photographs of areas of concern and the QSP's description of the problem, if any; and
- j. Inspector's name, title, and certification if any.

Visual Inspections are anticipated to be conducted by:

Assigned inspector: Insert Contractor's Name

Contact phone: Insert Contractor's number

Alternate inspector: Insert Contractor's Name

Contact phone: Insert Contractor's number

4. Water Quality Monitoring Requirements

Dischargers shall collect samples of non-visible pollutants. Samplers shall be the QSD, QSP, or be trained by the QSP.

Non-Visible Pollutant Monitoring Requirements:

- a. Dischargers shall implement sampling and analysis requirements to monitor non-visible pollutants when there is:
 - i. Evidence of pollutant releases that are not visually detectable in stormwater discharges; and
 - ii. Releases of substances which could cause or contribute to an exceedance of water quality objectives in the receiving waters.
- b. Dischargers are required to conduct sampling and analysis for non-visible pollutants identified in the SWPPPP or otherwise known to be on site, only when the pollutants may be discharged due to failure to implement BMPs, a container spill or leak, or a BMP breach, failure, or malfunction.
- c. Discharger shall collect at least one sample, within 8 hours, from each discharge location hydraulically down-gradient from the observed triggering event or condition.
- d. Dischargers shall continue to collect at least once sample per applicable discharge location for each 24-hour period that there is a discharge, until the necessary corrective actions are completed to control further discharge of the pollutant.
- e. Dischargers are not required to sample if one of the conditions described in item b above (e.g., breach or spill) occurs and, prior to discharge, the material containing the pollutant is fully remediated or removed; and BMPs to control the pollutant are implemented, maintained, or replaced as necessary.
- f. Dischargers shall analyze samples in the field or submit them to a laboratory as specified in this section for analysis of all non-visible pollutants suspected to be present in the discharge, including applicable TMDL-specific pollutants listed in Table 7.

Assigned Sampler: Insert Contractor's Name

Contact phone: Insert Contractor's number

Alternate Sampler: Insert Contractor's Name

Contact phone: Insert Contractor's number

5. Sample Collection and Handling Instructions

Dischargers shall

- a. Identify applicable parameters that require laboratory analysis for each stormwater discharge location (pH and turbidity are typically analyzed with field meters).
- b. Request the laboratory provide the appropriate number of sample containers, types of containers, sample container labels, blank Chain of Custody forms, and sample preservation instructions.

- c. Use the appropriate sample shipping method to the laboratory. The laboratory should receive samples within 48 hours of the physical sampling (unless otherwise required by the laboratory to meet all method hold times). The options are to either deliver the samples to the laboratory, arrange to have the laboratory pick them up, or ship them overnight to the laboratory.
- d. Use only the sample containers provided/specified by the laboratory to collect and store samples. Use of any other type of containers could cause sample contamination.
- e. Prevent sample contamination by not touching or putting anything into the sample containers before collecting stormwater samples.
- f. Not overfill sample containers. Overfilling can change the analytical results.
- g. Secure each sample container cap without stripping the cap threads.
- h. Label each sample container. The label shall identify the date and time of sample collection, the person taking the sample, and the sample collection location or discharge point. The label should also identify any sample containers that have been preserved.
- i. Carefully pack the sample container into an ice chest or refrigerator to prevent breakage and maintain temperature during shipment; frozen ice packs or ice is placed into the shipping container to keep the sample close to 4 deg C (39 deg F) until arriving at the laboratory (do not freeze samples).
- j. Complete a chain of Custody form with each set of samples. The Chain of Custody form shall include the discharger's name, address, and phone number, identification of each sample container and sample collection point, person collecting the samples, the date and time each sample container was filled, the analysis that is required for each sample container, and both the signatures of the person relinquishing and receiving the sample containers. container and sample collection point, person collecting the samples, the date and time each sample container was filled, the analysis that is required for each sample container, and both the signatures of the persons relinquishing and receiving the sample containers.

The Discharger shall designate and train personnel for the collection, maintenance, and shipment of samples in accordance with the above sample protocols and laboratory-specific practices.

Dischargers shall perform all sampling and preservation protocols in accordance with the 40 Code of Federal Regulations Part 136 and the current edition of 'Standard Methods for the Examination of Water and Wastewater' (American public Health Association unless other test procedures have been specified in the General Permit or by the Water Boards).

Dischargers may refer to the Surface water Ambient Monitoring Program's (SWAMP) Quality Assurance Program Plan (QAPrP) for more information on sampling collection and analysis.

Samples shall be analyzed using the analytical methods identified in the Table 6

Company Name: Insert selected laboratory, search

<https://waterboards.maps.arcgis.com/apps/webappviewer/index.html?id=bd0bd8b42b1944058244337bd2a4ebfa>

Street Address: Insert street address

City, State Zip: Insert city and zip

Telephone Number: Insert contact number

Search waterboards GIS for accredited lab

<https://waterboards.maps.arcgis.com/apps/webappviewer/index.html?id=bd0bd8b42b1944058244337bd2a4ebfa>

The list below are the specific sources (but not limited to)/types of potential non-visible pollutants on the project site:

- Adhesives
- Asphalt Works
- Cleaning (Bleaches, Acids, TSP, Solvents, Detergents)
- Concrete/Masonry Work (Sealants, Curing compounds, Additives)
- Form/Framing – woods
- Grading/Earthwork
- Liquid Wastes/Utility line flushing/Pipe testing/Sanitary Wastes
- Paints
- Plumbing/Soldering/Pipe Fittings
- Solid wastes
- Vehicle and Equipment Use Table 4.2 lists pollutant sources associated with different construction phases, associated field test and water quality indicator constituent(s) for that pollutant.

Table 5 lists pollutant sources associated with different construction phases, associated field test and water quality indicator constituent(s) for that pollutant.

Table 5 Pollutant Sources, Field Test and Indicator Constituents

Pollutant Source	Field Test ⁽¹⁾	Water Quality Indicator Constituent
Demolition		
Sediment	(visible)	Turbidity
Paint Strippers	N/A	Volatile Organics
Solvents	N/A	Volatile Organics
Adhesives	N/A	Semi-Volatile Organics
Vehicle Fuels	(visible)	Oil and Grease or TPH
Metals	N/A	Total/Dissolved Metals
Bacteria	N/A	Total/Fecal Coliform
Litter	(visible)	Pollutants
Utility Installation		
Sediment	(visible)	Turbidity
Fuels/Lubricants	N/A	Oil and Grease/TPH
Chlorinated Water	Colorimetric	
Concrete	pH	Lab pH

Pesticides/Herbicides	N/A	Pesticide Scan/Semi-Volatile Organics
Fertilizers	N/A	NO ₃ /NH ₃ /P
Bacteria	N/A	Total/Fecal Coliform
Vertical Construction		
Sediment	(visible)	Turbidity
Paint Strippers	N/A	Volatile Organics
Solvents, Thinners	N/A	Volatile Organics
Detergents	Colorimetric	MBAS
Adhesive, Sealants, Resins	N/A	Semi-Volatile Organics
Fuels, Lubricants, Hydraulic Fluid	N/A	Oil and Grease or TPH
Concrete	pH	Lab pH
Litter	(visible)	Pollutants
Bacteria	N/A	Total/Fecal Coliform
Organics	N/A	Semi-Volatile Organics
Paint	(visible)	VOC's
Wood (sawdust)	(visible)	Synthetic Organics
Acid Wash	pH	Lab pH
Asphalt (liquid)	N/A	TPH
Habitat Conservation		
Sediment	(visible)	Turbidity
Nutrients (Fertilizers)	N/A	NO ₃ /NH ₃ /P
Bacteria	N/A	Total/Fecal Coliform

6. Analytical Methods Requirements

Dischargers shall refer to Table 6 for applicable test methods, detection limits, and reporting units.

Table 6 – Test Methods, Detection Limits and Reporting Units

Parameter	Test Method	Discharger Type	Method Detection Limit	Reporting Units

pH	Field test with calibrated portable instrument using U.S. EPA approved procedures	Risk Level 2 and 3	0.2	pH units
Turbidity	U.S. EPA 0180.1 and/or field test with calibrated portable instrument	Risk Level 2 and 3	1	NTU
Non-Visible Pollutant Parameter(s)	U.S. EPA-approved test method for the specific pollutant parameter	All Risk Levels	Dependent on the test method	Dependent on the test method

All Monitoring instruments and equipment shall be calibrated and maintained in accordance with manufacturers' specifications to ensure accurate measurements. Additionally, records of calibration shall be retained for at least three years and made available upon request.

All analyses of laboratory-analyzed parameters shall be sent to and conducted at a laboratory recognized by the State Water Board Environmental Laboratory Accreditation Program (ELAP), with the exception of field analysis conducted by the discharger for turbidity and pH.

All dischargers shall assign a value of zero (0) for all non-visible pollutant analytical results less than the minimum level (reporting limit), as reported by the laboratory, used in calculations required by this permit (e.g., numeric action level and numeric effluent limitation exceedance determinations), so long as a sufficiently sensitive test method was used as evidenced by the reported method detection limit and minimum level.

7. Exceedance Response Requirements

Dischargers are subject to the applicable numeric action levels and/or numeric effluent limitations based on their Risk Level as shown in Table 7 below.

Table 7 – Numeric Action/Effluent limitations per Risk Level

Parameter	Discharger Type	Numeric Action Level	Numeric Effluent Limitation
pH	Risk Level 2 and 3	Lower = 6.5 Upper = 8.5	Not Applicable
Turbidity	Risk Level 2 and 3	250 NTU	Not applicable
TMDL-related Pollutant	Any Risk Level	Refer to Table H-2 in Attachment H	Refer to Table H-2 in Attachment H

For pH and turbidity, the discharger shall use the field meter readings obtained from each discharge location per day of discharge to determine if there has been an exceedance of the numeric action levels.

Whenever analytical results indicate that the discharge is below the lower pH value, above the upper pH value, exceeds the turbidity value, or exceeds an applicable TMDL-related numeric action level or numeric effluent limitation, dischargers shall determine the source(s) of the pollutant and immediately implement corrective actions to:

- a. Meet Best Available Technology Economically Achievable and Best Conventional Pollutant Control Technology requirements in 40 Code of Federal Regulations 450.21 through 450.23; and
- b. Reduce or prevent pollutants in stormwater and authorized non-stormwater discharges from causing further exceedances.

Dischargers shall iterate corrective actions until the discharge is in compliance with the applicable numeric action level(s).

The source evaluation shall be kept with the SWPPP and specifically address what corrective actions were taken or will be taken and provide a schedule for their completion.

8. Reporting Requirements

Dischargers shall keep all completed visual inspection checklists and related documentation with the SWPPP on-site or electronically.

Non-Visible Pollutant Monitoring Reporting

- a. All dischargers that conducted non-visible pollutant monitoring shall electronically submit through SMARTS all field and/or analytical sampling results within 30 days after obtaining the analytical result or within 10 days after if the analytical results demonstrate the exceedance of an applicable TMDL-related numeric action level or numeric effluent limitation or Basin Plan parameter.
- b. All dischargers that exceeded an applicable TMDL-related numeric action level shall prepare a Numeric Action Level Exceedance Report when requested, in writing, from a Regional Water Board delegate and shall submit and certify each Numeric Action Level Exceedance Report through SMARTS within 30 days of receiving the written request, in accordance with Section IV of the General Permits' Order.
- c. The Numeric Action Level Exceedance Report shall include:
 - i. The analytical method(s), method reporting unit(s), and method detection limits(s) for each parameter.
 - ii. The date, place, time of sampling, visual inspections, and/or measurements, including precipitation; and
 - iii. An assessment of the existing BMPs associated with the sample that exceeded the numeric action level, a description of each corrective action taken including photographs, and date of implementation.

- d. All dischargers that prepared a Numeric Action Level Exceedance Report shall retain a copy of the report for a minimum of three years after the date the exceedance report is certified and submitted.
- e. All dischargers that exceed an applicable TMDL-related numeric effluent limitation shall comply with the water quality-based corrective action requirements in Section VI.Q of the Order.

APPENDIX B

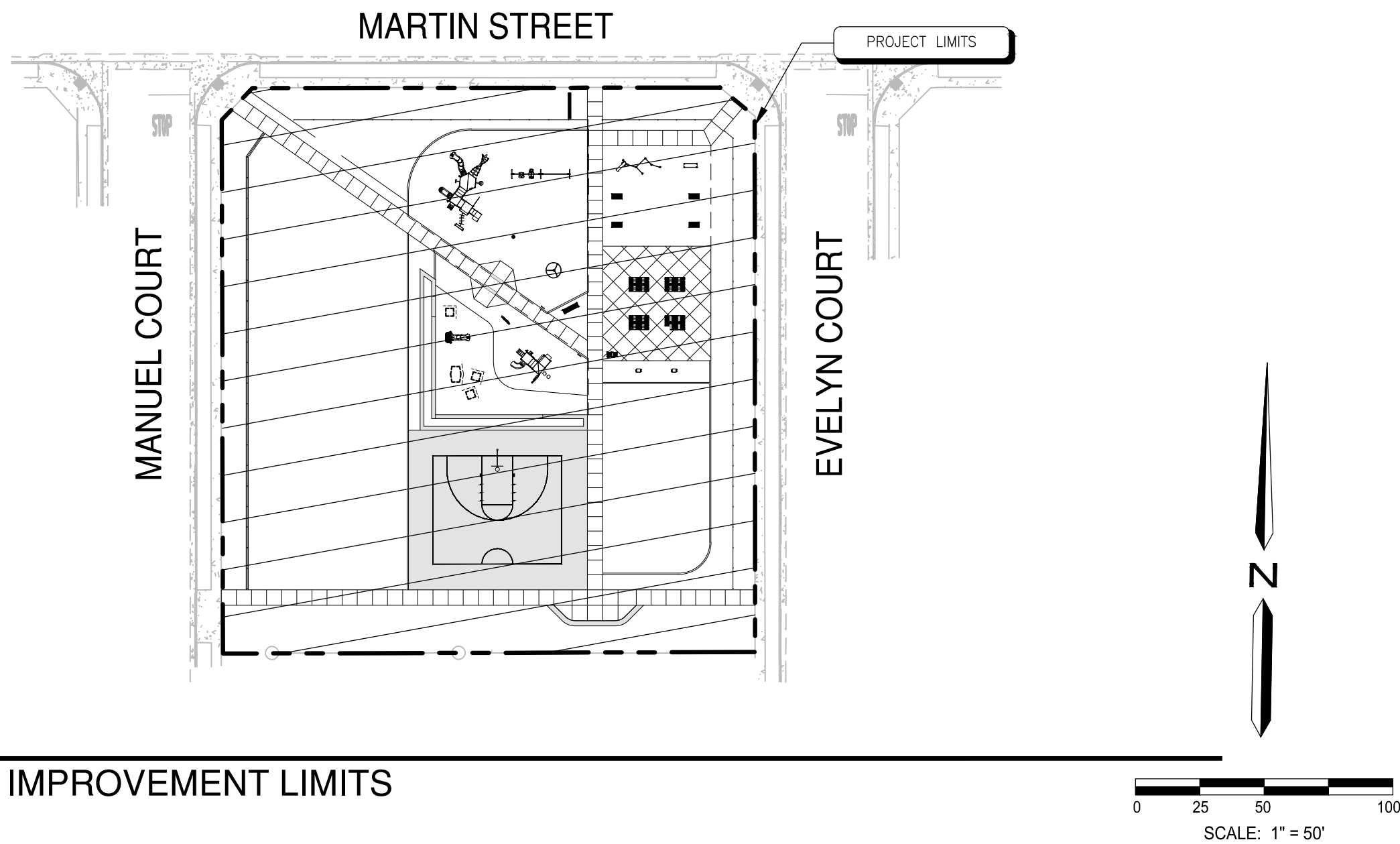
GENERAL LOCATION MAP

GENERAL NOTES

1. LANDSCAPE IMPROVEMENTS SHALL BE CONSTRUCTED IN COMPLIANCE WITH CITY OF LOS BANOS, CALIFORNIA CURRENT STANDARDS AND SPECIFICATIONS AS APPROVED INCLUDING ALL AMENDMENTS THERETO TO DATE. IMPROVEMENTS SHALL ALSO BE IN COMPLIANCE WITH CALIFORNIA DEPARTMENT OF TRANSPORTATION (CALTRANS) STANDARD SPECIFICATIONS LATEST EDITION, WHERE APPLICABLE. IN THE EVENT THERE IS A CONFLICT WITH THE PLANS AND REFERENCES STATED ABOVE, THE COVERING BODY STANDARDS AND SPECIFICATIONS SHALL PREVAIL. ALL WORK SHALL BE SUBJECT TO INSPECTION.
2. DESIGN: THE DRAWINGS HEREIN REPRESENT THE DESIGN TO BE IMPLEMENTED ON THE SITE DEPICTED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING THE LANDSCAPE ARCHITECT TO CLARIFY PLAN DETAILS RELATED TO SITE OR CONSTRUCTION DETAILS NECESSARY FOR PROJECT COMPLETION.
3. COORDINATION: CONTRACTORS SHALL COORDINATE INSTALLATION AND SCHEDULING WITH THAT OF THE CITY AND OTHER CONTRACTORS EFFICIENTLY AND IN A TIMELY MANNER, ENSURING THE PROJECT COMPLETION IS UNIMPEDED AND INSTALLED CORRECTLY WITH MINIMAL MAINTENANCE. THE CITY SHALL BE CONTACTED DIRECTLY AT LEAST TWO WORKING DAYS (48 HOURS) PRIOR TO COVERING, COMPLETION, OR EXPOSING WORK THAT WILL BE INSTALLED.
4. SITE CONDITIONS: SEE GENERAL PROVISIONS, SPECIAL PROVISIONS, GENERAL REQUIREMENTS, AND TECHNICAL SPECIFICATIONS FOR CONTRACTOR RESPONSIBILITIES RELATED TO SITE CONDITIONS. CONTRACTOR SHALL EXAMINE EXISTING CONDITIONS OF SITE. IN THE EVENT THAT ON-SITE CONDITIONS DIFFER FROM CONDITIONS DEPICTED ON PLANS AND WILL IMPACT THE INSTALLATION PROCESS, THE CONTRACTOR SHALL SUBMIT THESE FINDINGS TO THE LANDSCAPE ARCHITECT/CITY IN WRITING PRIOR TO BEGINNING WORK. CONTRACTOR SHALL CONFIRM ALL POINTS OF CONNECTIONS PRIOR TO CONSTRUCTION. COMMENCEMENT OF WORK IMPLIES ACCEPTANCE OF THE EXISTING SITE CONDITIONS.
5. BASE INFORMATION: THE PROPOSED LANDSCAPE IMPROVEMENTS SHOWN HEREIN ARE SUPERIMPOSED OVER DATA PROVIDED TO THE LANDSCAPE ARCHITECT BY OTHER SOURCES. THE LANDSCAPE ARCHITECT SHALL NOT BE HELD LIABLE FOR THE CHANGES, INACCURACIES, OMISSIONS, OR OTHER ERRORS RELATED TO THIS DATA. THE BASE INFORMATION IS PROVIDED AS AN AID ONLY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REVIEWING ALL DOCUMENTS AND ACCOMMODATING ANY DISCREPANCIES.
- BASE INFORMATION PROVIDED BY:
TOPOGRAPHICAL SURVEY –
• O'DELL ENGINEERING
1165 SCENIC DRIVE, SUITE A
MODESTO, CA 95350
PHONE: (209)571-1765
6. BIDDING INFORMATION: SEE GENERAL PROVISIONS, SPECIAL PROVISIONS, GENERAL REQUIREMENTS, AND TECHNICAL SPECIFICATIONS FOR CONTRACTOR RESPONSIBILITIES RELATED TO BIDDING INFORMATION AND SITE VISITS PRIOR TO BID SUBMITTAL.
7. PRE-CONSTRUCTION MEETING: THE CONTRACTOR SHALL OBTAIN A GRADING PERMIT/BUILDING PERMIT, FROM THE CITY OF LOS BANOS, CALIFORNIA BUILDING DEPARTMENT, PRIOR TO SCHEDULING A PRE-CONSTRUCTION MEETING OR OBTAINING AN ENCROACHMENT PERMIT. A PRE-CONSTRUCTION MEETING SHALL BE COORDINATED WITH THE APPROPRIATE REGULATORY BODY PRIOR TO BEGINNING WORK. APPLICABLE AGENCIES AND PARTIES SHALL BE NOTIFIED AT LEAST 3 WORKING DAYS (72 HOURS) IN ADVANCE OF THE PRE-CONSTRUCTION MEETING.
8. UTILITIES: THE CONTRACTOR AND ANY SUBCONTRACTORS SHALL CONTACT U.S.A. AT LEAST TWO WORKING DAYS (48 HOURS) PRIOR TO BEGINNING WORK.
9. POT HOLING: ONLY EXCAVATION WILL REVEAL ACTUAL TYPES, LOCATIONS, SIZES, AND DEPTHS OF UNDERGROUND UTILITIES. THE LANDSCAPE ARCHITECT ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF UNDERGROUND UTILITIES OR OF BURIED EXISTING OBJECTS AND UTILITIES NOT SHOWN ON THESE PLANS.
10. AS-BUILTS: FOR AS-BUILT PURPOSES, THE CONTRACTOR SHALL KEEP A CURRENT SET OF DRAWINGS ON SITE AT ALL TIMES WITH DEVIATIONS FROM ORIGINAL PLANS AND SPECIFICATIONS NOTED. UPON PROJECT COMPLETION THE CONTRACTOR SHALL PROVIDE THE CITY WITH A DIGITAL FORMAT, COMPLETE SET OF AS-BUILT DRAWINGS.

SUNRISE RANCH PARK

LANDSCAPE IMPROVEMENT PLANS
LOS BANOS, CALIFORNIA



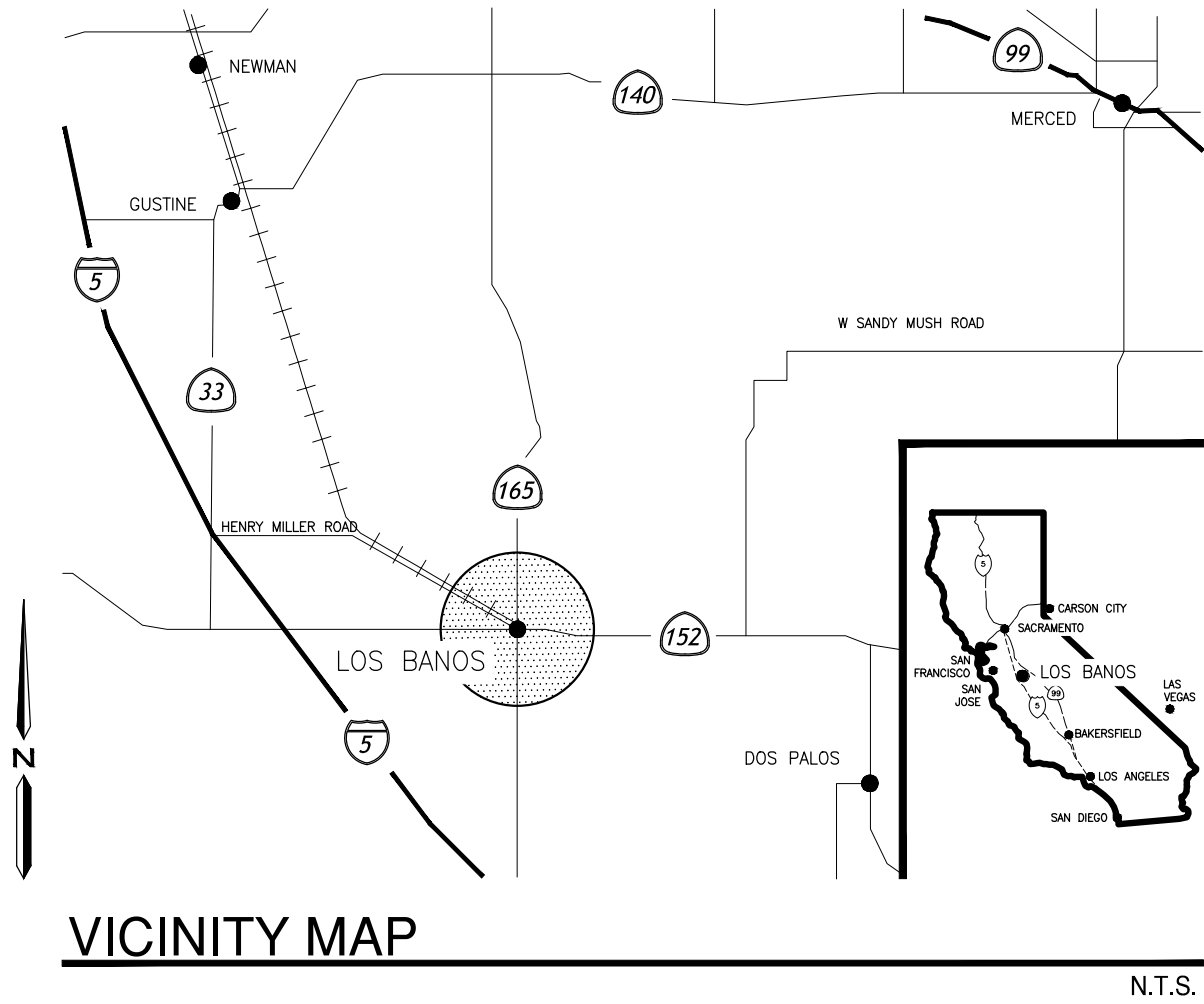
LANDSCAPE IMPROVEMENT LIMITS

PROJECT INFORMATION

PROJECT TITLE:	SUNRISE RANCH PARK	PROJECT TYPE:	NEW CONSTRUCTION
PARCEL NUMBER:	42808	GRADING PLANS:	SEE CIVIL ENGINEERING PLANS
ZONING:	PI – PUBLIC & INSTITUTIONAL	BUILDING ELEVATIONS:	N/A
PROJECT ADDRESS:	MARTIN ST. LOS BANOS, CA, 93635	WATER SUPPLY TYPE & LOCAL PURVEYOR:	POTABLE : THE CITY OF LOS BANOS
APPLICANT/OWNER:	JOE HEIM CITY OF LOS BANOS 520 J ST. LOS BANOS, CA, 93635 (209) 827 – 7000 JOE.HEIM@LOSBANOS.ORG	COMMUNITY FORESTRY DEPT. CONTACT:	N/A
PLANS PREPARED BY:	O'DELL ENGINEERING 1165 SCENIC DRIVE, SUITE A MODESTO, CA 95350 (209) 571-1765 OFFICE (209) 571-2466 FAX EMAIL: CKENNEDY@ODELLENGINEERING.COM	ADJACENT PROPERTY USES:	NORTH – RESIDENTIAL SOUTH – RESIDENTIAL EAST – RESIDENTIAL WEST – RESIDENTIAL
LICENSE NUMBER:	CLA #5426	UTILITY PLANS:	SEE CIVIL ENGINEERING PLANS
LANDSCAPE AREA:	29,322 SQUARE FEET	SOIL REPORT:	NOTES: SOIL AMENDMENTS IN THE GENERAL PLANTING NOTES ARE FOR BID PURPOSES ONLY, ACTUAL AMENDMENTS SHALL REFLECT THE RECOMMENDATIONS OF THE REPORT ONCE FINAL MASS GRADING HAS BEEN PERFORMED AND SAMPLES HAVE BEEN SUBMITTED TO SOILS LAB.

APPROVED BY THE CITY OF LOS BANOS, CALIFORNIA

BY: _____ DATE: _____



VICINITY MAP

SHEET INDEX

SHEET NUMBER	SHEET TITLE
CS	COVER SHEET
L1.0	DEMOLITION PLAN
L2.0	EROSION CONTROL PLAN
L3.0	GRADING PLAN
L4.0	SITE FEATURES, FINISHES AND STRIPING LEGEND AND NOTES
L4.1	SITE FEATURE AND FINISHES PLAN
L5.0	HORIZONTAL CONTROL PLAN
L6.0	IRRIGATION LEGEND AND NOTES
L6.1	IRRIGATION PLAN
L7.0	PLANTING LEGEND AND NOTES
L7.1	PLANTING PLAN
L8.0	SITE SECTIONS
L9.0	CONSTRUCTION DETAILS
L9.1	CONSTRUCTION DETAILS
L9.2	CONSTRUCTION DETAILS
L10.0	IRRIGATION DETAILS
L10.1	IRRIGATION DETAILS
L11.0	PLANTING DETAILS

ABBREVIATIONS

BC	BOTTOM OF CURB	GB	GRADE BREAK
BW	BOTTOM OF WALL	HP	HIGH POINT
BOW	BACK OF WALK	INV	INVERT
BR	BOTTOM OF RAMP	LP	LOW POINT
CJ	TOOLED CONTROL JOINT	MAX	MAXIMUM
CL	CENTERLINE	ME	MECHANICAL ENGINEER
CLR	CLEAR	MIN	MINIMUM
CIP	CAST IN PLACE	(N)	NEW
CMU	CONCRETE MASONRY UNIT	OC	ON CENTER
C	CONCRETE	PA	PLANTING AREA
C(R)	CONCRETE RAMP	PIP	POURED IN PLACE CONCRETE
DG	DECOMPOSED GRANITE	POB	POINT OF BEGINNING
DWGS	DRAWINGS	R	RADIUS
(E) OR EX	EXISTING	RIM	RIM ELEVATION
EJ	EXPANSION JOINT	RP	RADIUS POINT
EQ	EQUAL	SAD	SEE ARCHITECTURAL DRAWINGS
FC	FACE OF CURB	SCD	SEE CIVIL DRAWINGS
FDE	FINISH DECK ELEVATIONS	SED	SEE ELECTRICAL DRAWINGS
FF/FFE	FINISH FLOOR ELEVATION	SIM	SIMILAR
FG	FINISH GRADE	SLD	SEE LANDSCAPE DRAWINGS
FL	FLOW LINE	SP	SPACE
FOB	FACE OF BUILDING	TBD	TO BE DETERMINED
FOW	FACE OF WALL	TC	TOP OF CURB
FS	FINISH SURFACE	TP	TOP OF PAVEMENT
FSS	FINISH SUB-SURFACE	TFC	TOP OF FLUSH CURB
FV	FIELD VERIFY	TR	TOP OF RAMP
HP	HIGH POINT	TW	TOP OF WALL
		TYP	TYPICAL



100% SUBMITTAL

PLAN REVISIONS		
NO.	DATE	REVISION



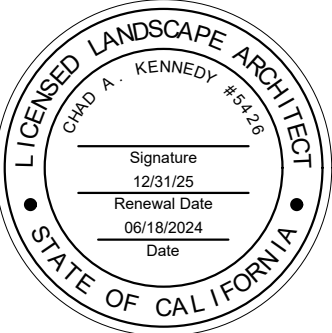
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LANDSCAPE IMPROVEMENT PLANS
SUNRISE RANCH PARK

LOS BANOS, CALIFORNIA

COVER SHEET



APPROVED:

DESIGNED:	MS
DRAWN:	MS
CHECKED:	CK
SCALE:	1" = 50'
DATE:	06/18/2024
JOB NO.:	41356
FILE NO.:	41356-CS.DWG

SHEET NO.

CS

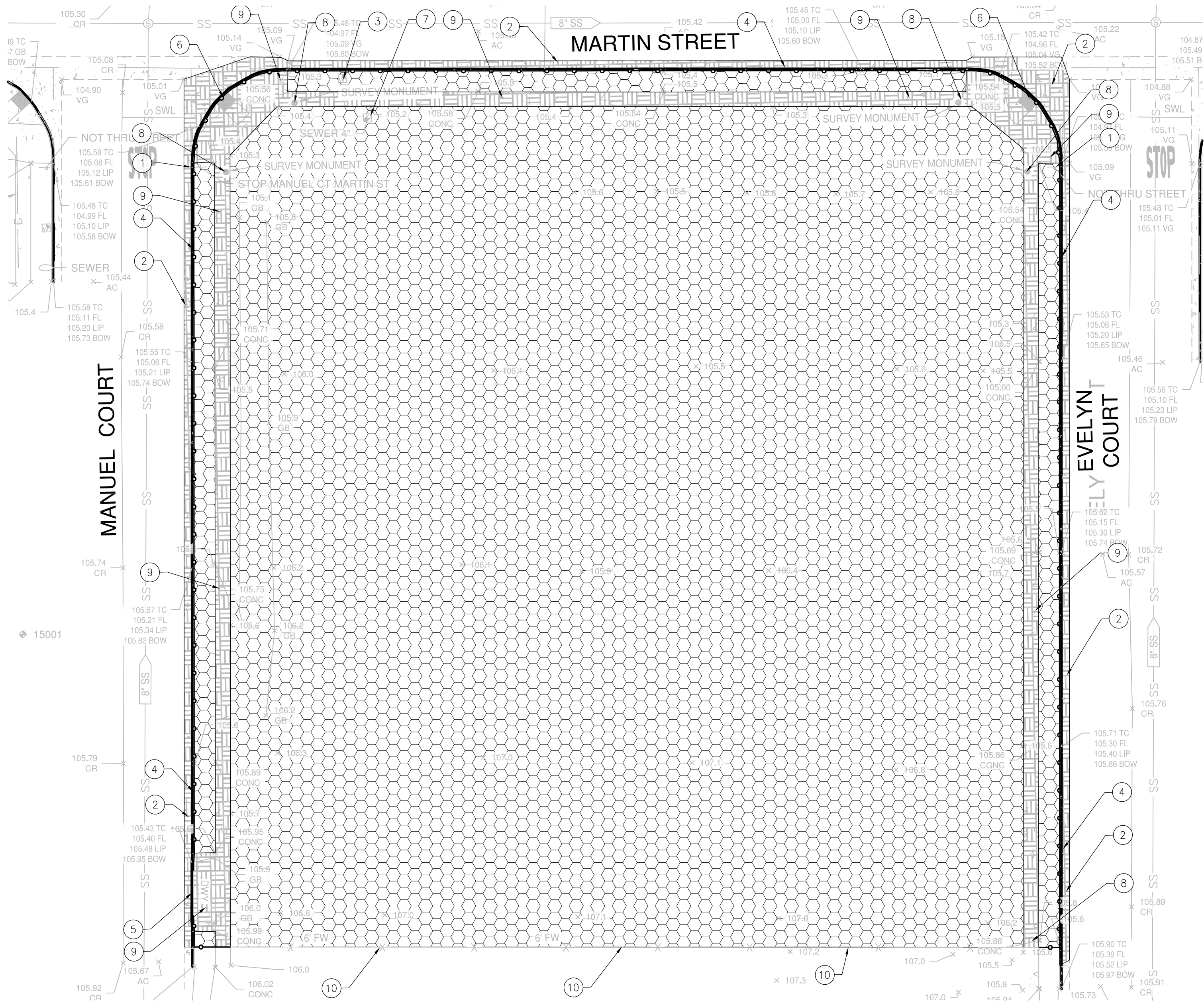
OF

18

APPENDIX C

SITE MAPS

H:\41356 Sunrise Ranch Park FW Landscape\ConstPlans\41356-DM.dwg HU: 19:42:24 06/24/2024



DEMOLITION LEGEND

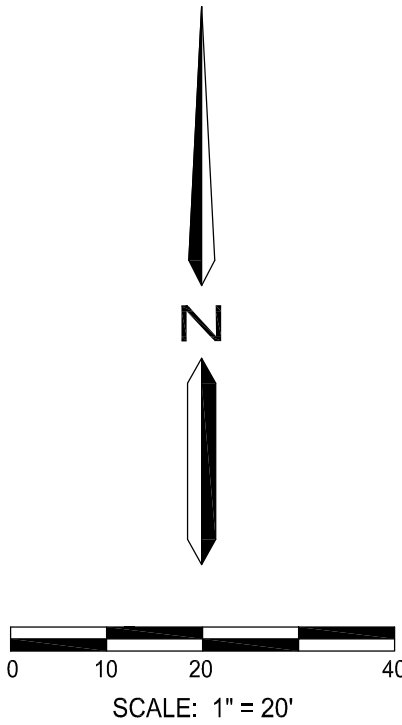
SYMBOL	DESCRIPTION
	CLEAR AND GRUB. REMOVE TURF, MULCH, PLANTS, WEEDS AND SURFACE MATERIALS, IRRIGATION LATERALS, AND IRRIGATION HEADS AND DISPOSE OFF-SITE AT CONTRACTOR'S EXPENSE. RECONNECT AS SHOWN ON LANDSCAPE PLANS. ±52,196 SF
	LIMIT OF WORK (LOW)
	CONSTRUCTION FENCING ±667 LF
	EXISTING FENCE SHALL BE PROTECTED IN PLACE ±211 LF
	EXISTING CITY SIDEWALKS, CURB RAMPS, AND GUTTER TO REMAIN.

DEMOLITION NOTES

- ALL ITEMS SCHEDULED FOR REMOVAL SHALL BE PROPERLY DISPOSED OFF-SITE AT THE CONTRACTORS' EXPENSE, OR RETURNED TO THE CITY AS DIRECTED BY STAFF. VERIFY DIRECTION WITH CITY PRIOR TO CONSTRUCTION.
- CONTRACTOR SHALL COORDINATE WITH ALL UTILITY COMPANIES AND PUBLIC AGENCIES TO DISCONNECT EXISTING UTILITIES TO THE PROJECT SITE PRIOR TO DEMOLITION.
- CONTRACTOR SHALL PROTECT ALL UTILITY STRUCTURES UNLESS OTHERWISE NOTED.
- CONSTRUCTION FENCE SHALL BE INSTALLED PRIOR TO CONSTRUCTION AND REMAIN IN PLACE FOR THE DURATION OF THE CONSTRUCTION. CONTRACTOR SHALL LIMIT ROAD CLOSURE.

SHEET NOTES

- EXISTING SIGN TO REMAIN & BE PROTECTED IN PLACE.
- EXISTING CURB AND GUTTER SHALL BE PROTECTED IN PLACE.
- EXISTING WATER METER SHALL BE FIELD VERIFIED AND PROTECTED IN PLACE.
- CONTRACTOR SHALL ROUTE CONSTRUCTION FENCE ALONG BACK OF CURB
- CONTRACTOR SHALL INSTALL TEMPORARY CONSTRUCTION ACCESS GATE.
- EXISTING ADA RAMP TO REMAIN & BE PROTECTED IN PLACE.
- EXISTING SANITARY SEWER TO REMAIN AND BE PROTECTED IN PLACE.
- EXISTING SURVEY MONUMENT TO REMAIN AND BE PROTECTED IN PLACE.
- CONCRETE FLATWORK TO REMAIN AND BE PROTECTED IN PLACE.
- EXISTING WOOD LOT LINE FENCE TO REMAIN AND BE PROTECTED IN PLACE.



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PLAN REVISIONS		
NO.	DATE	REVISION



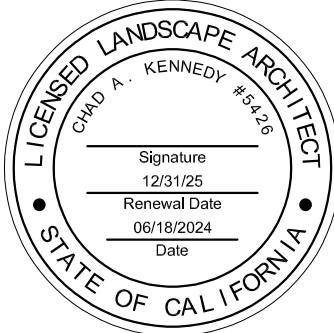
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LANDSCAPE IMPROVEMENT PLANS
SUNRISE RANCH PARK

LOS BANOS, CALIFORNIA

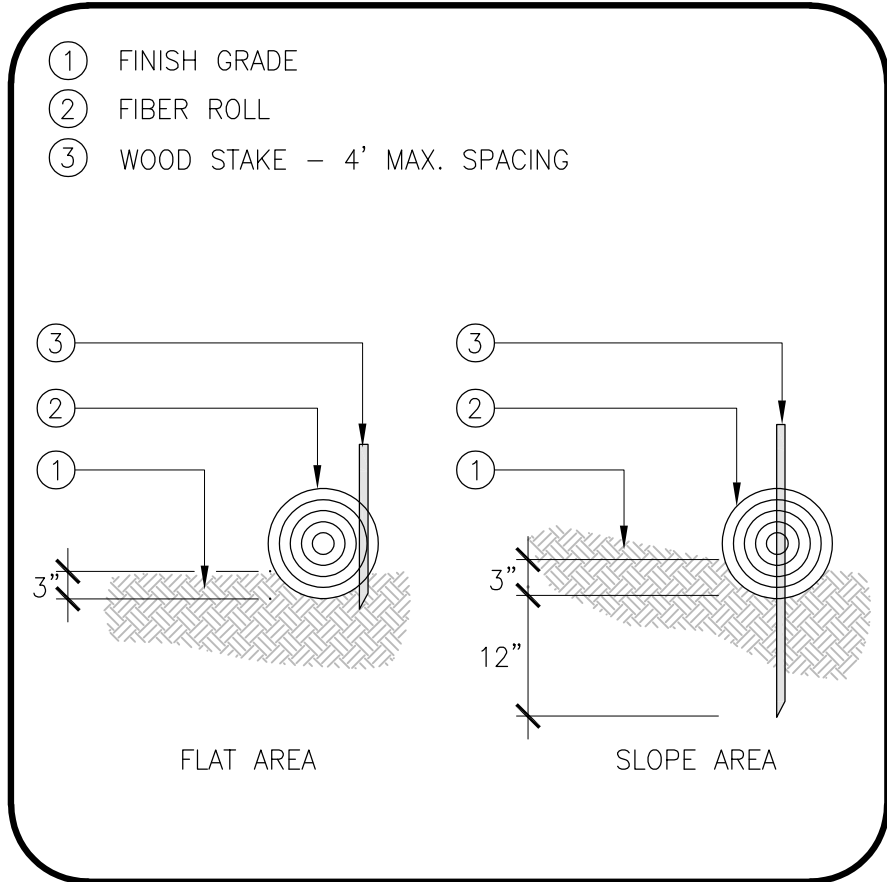
DEMOLITION PLAN



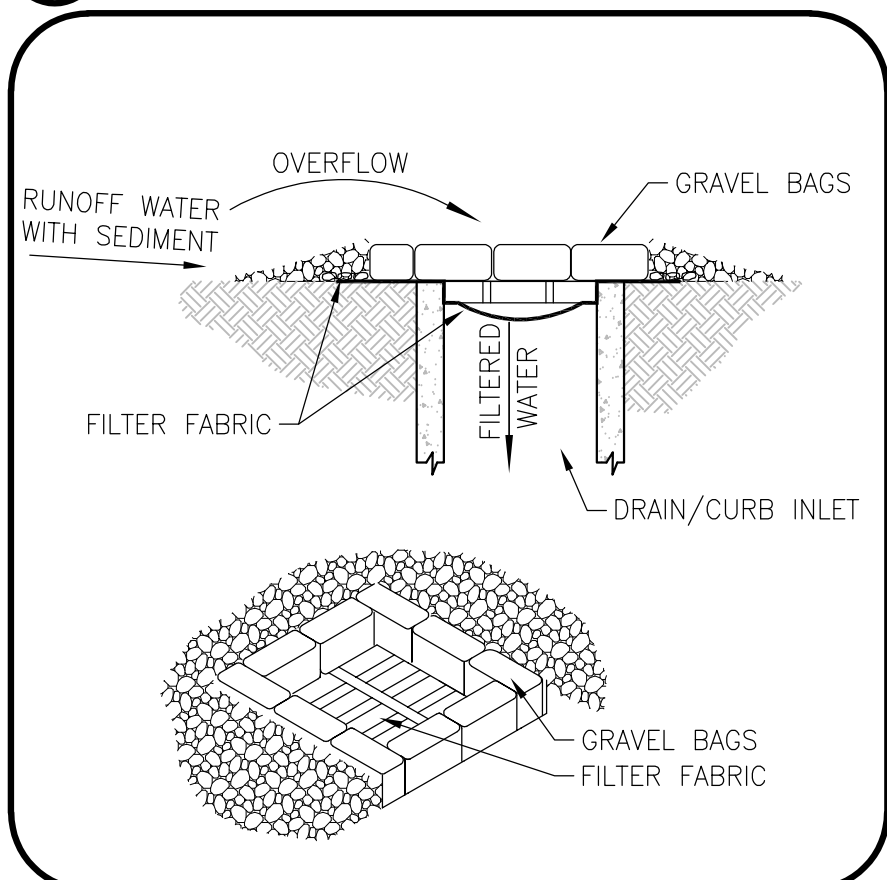
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DATE: 06/18/2024
JOB NO.: 41356
FILE NO.: 41356-DM.DWG

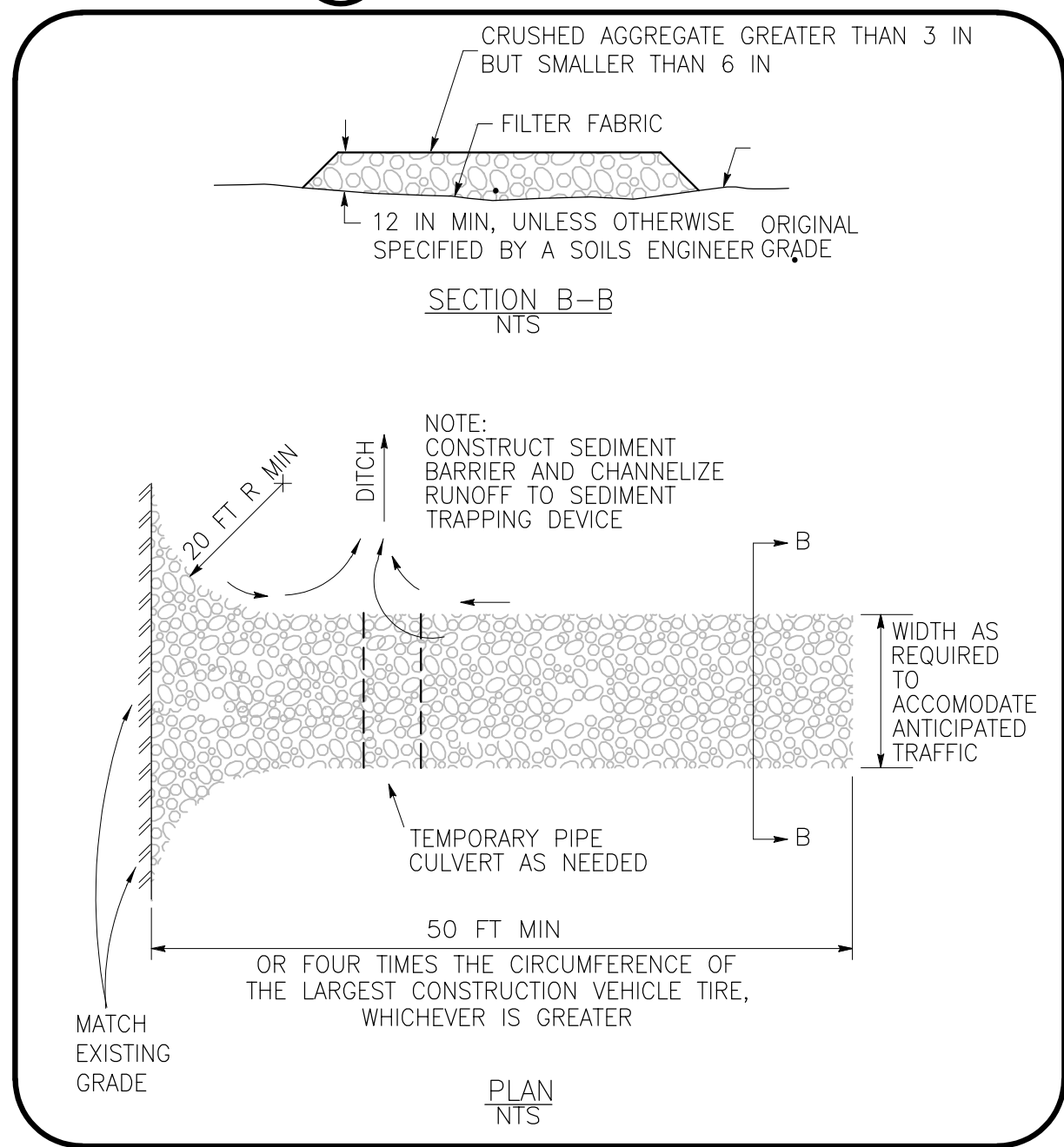
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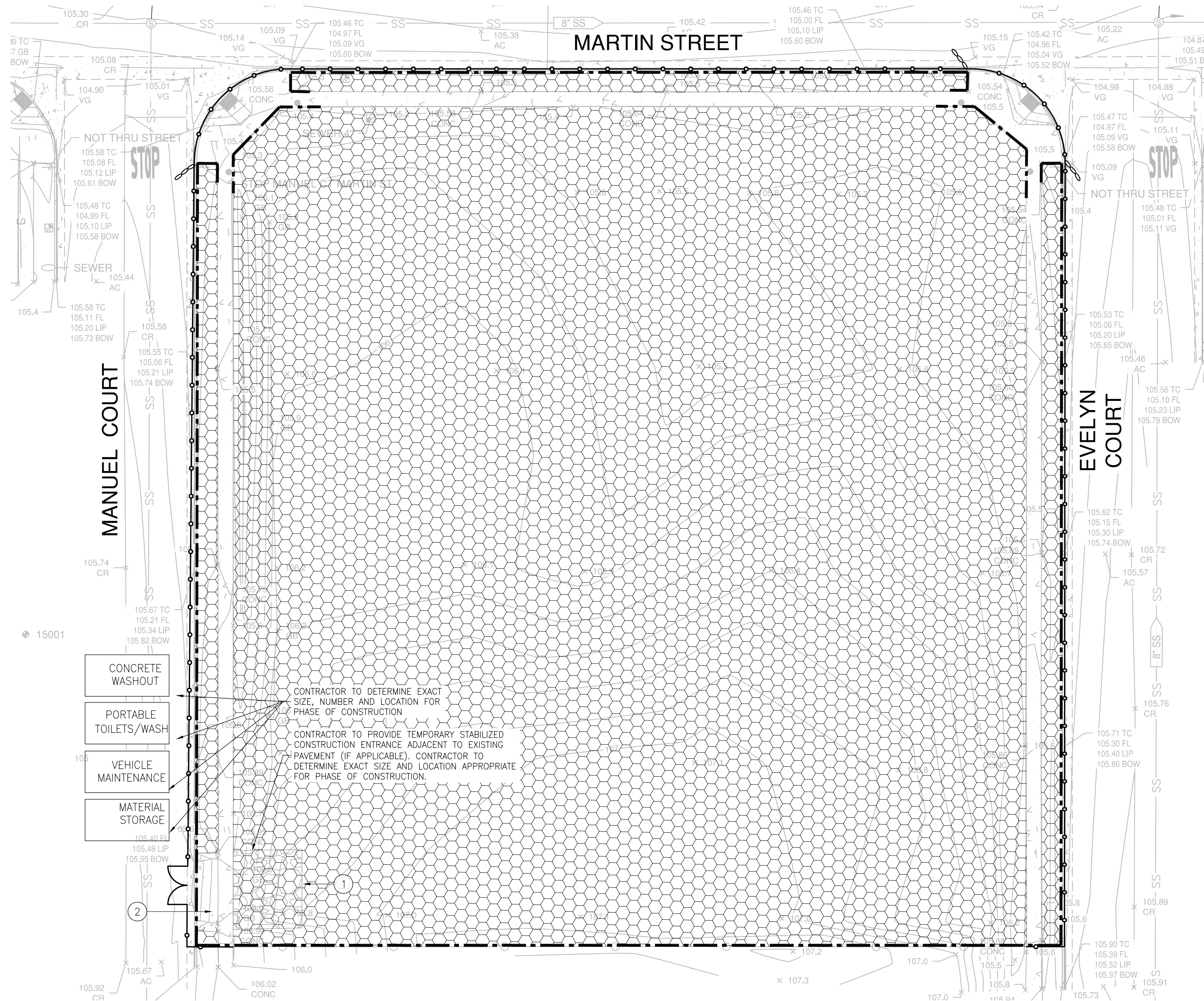
① FIBER ROLL ENTRENCHMENT DETAIL
NOT TO SCALE



② SEDIMENT CONTROL @ STORM DRAIN INLET
NOT TO SCALE



③ STABILIZED CONSTRUCTION ENTRANCE/EXIT
NOT TO SCALE



SHEET NOTES

- DESIGNATED CONSTRUCTION ENTRANCE. CONTRACTOR TO MAINTAIN ENTRANCE TO REMAIN FREE OF MUD AND DEBRIS. WASH TIRES AS NEEDED TO MAINTAIN ENTRANCE AND PREVENT TRACKING OFF SITE. SEE DETAIL 3, THIS SHEET.
- CONTRACTOR SHALL PROTECT EXISTING PAVEMENT, CURB AND GUTTER IN PLACE. IF DAMAGED, CONTRACTOR SHALL REPLACE AT NO ADDITIONAL COST TO CITY.

EROSION CONTROL LEGEND

- FIBER ROLL, WHEN ADJACENT TO CONSTRUCTION FENCING, PLACE FIBER ROLL ON INSIDE OF CONSTRUCTION FENCING — SEE DETAIL 1 ON THIS SHEET.
- TEMPORARY GRAVEL BAGS, SEE DETAIL 2 ON THIS SHEET. IF NEEDED FOR EXCESS RUNOFF.
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- CLEAR AND GRUB. REMOVE TURF, MULCH, PLANTS, WEEDS AND SURFACE MATERIALS, IRRIGATION LATERALS, AND IRRIGATION HEADS AND DISPOSE OFF-SITE AT CONTRACTOR'S EXPENSE. RECONNECT AS SHOWN ON LANDSCAPE PLANS. ±52,196 SF

SEDIMENT CONTROL DEVICES

CONTRACTOR TO PROVIDE TEMPORARY SEDIMENT CONTROL DEVICE AT CATCH BASINS AS SHOWN IN DETAIL. CONTRACTOR MAY SUBSTITUTE OTHER SEDIMENT CONTROL DEVICES (GRAVEL BAGS, SILT TRAPS, ETC.) UNDER THE DIRECTION OF THE QSP. MODIFICATIONS TO THIS PLAN NEED TO BE APPROVED BY QSD, AND LOGGED IN THE SWPPP AMENDMENT LOG.

EACH SEDIMENT CONTROL DEVICE SHALL BE SECURED PER APPLICABLE BMP STANDARDS.

IF ANY SEDIMENT CONTROL DEVICES ARE MOVED AND/OR RELOCATED IN GAINING ACCESS TO THE SITE DURING THE WINTER MONTHS, THEY SHALL BE REPLACED IF THEY ARE NO LONGER STABLE. ONCE INSTALLED, ALL WINTERIZATION MATERIALS SHOULD BE CHECKED BEFORE EACH WEEKEND AND EACH STORM.

DUST CONTROL MEASURES

- CONTRACTOR TO PRACTICE DUST CONTROL MEASURES IN ACCORDANCE WITH THE CITY OF LOS BANOS STANDARDS THROUGHOUT CONSTRUCTION.

EROSION CONTROL NOTES:

- THIS PLAN PROVIDES EROSION CONTROL AND SEDIMENTATION INFORMATION AND DESIGN USING THE FOLLOWING ASSUMPTIONS:
 - GROUND HAS BEEN ROUGH GRADED
- CONTRACTOR SHALL ADJUST THE SEDIMENTATION AND EROSION CONTROL METHODS AS THE PROJECT DEVELOPS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT THE INSTALLED EROSION CONTROL AND SEDIMENTATION IMPROVEMENTS ARE IN CONFORMANCE WITH THE STATE OF CALIFORNIA STORM WATER POLLUTION PREVENTION PLAN GUIDELINES AND THE CALIFORNIA BEST MANAGEMENT PRACTICES.

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WINTERIZATION NOTES

- ALL MATERIALS NECESSARY FOR WINTERIZATION SHALL BE AVAILABLE AT THE SITE.
- WINTERIZATION SHALL BE INSTALLED ACCORDING TO THIS PLAN AND AS DIRECTED BY THE QUALIFIED SWPPP PRACTITIONER (QSP).
- FILL SLOPES: AVOID LEAVING SHINY, SMOOTH GRADED SURFACES. THE LAST GRADING OPERATION SHALL BE TO WALK A TRACK-TYPE TRACTOR UP AND DOWN THE SLOPE, CREATING CLEAT MARKS ON THE SLOPE WITH CONTOURS. THESE WILL PROVIDE SEED AND FIBER COLLECTION POINTS.
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PLAN REVISIONS		
NO.	DATE	REVISION



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LANDSCAPE IMPROVEMENT PLANS SUNRISE RANCH PARK LOS BANOS, CALIFORNIA

DEMOLITION EROSION CONTROL PLAN

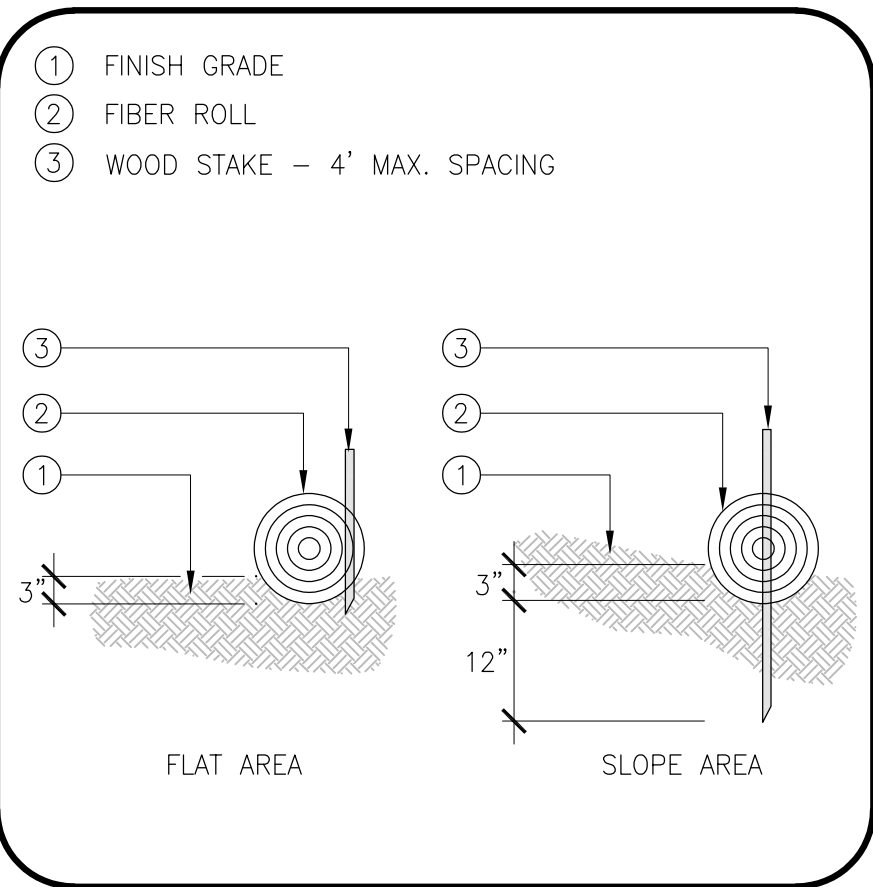
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DATE:	06/18/2024
JOB NO.:	41356
FILE NO.:	41356-DEC_2024-06-24_NRD



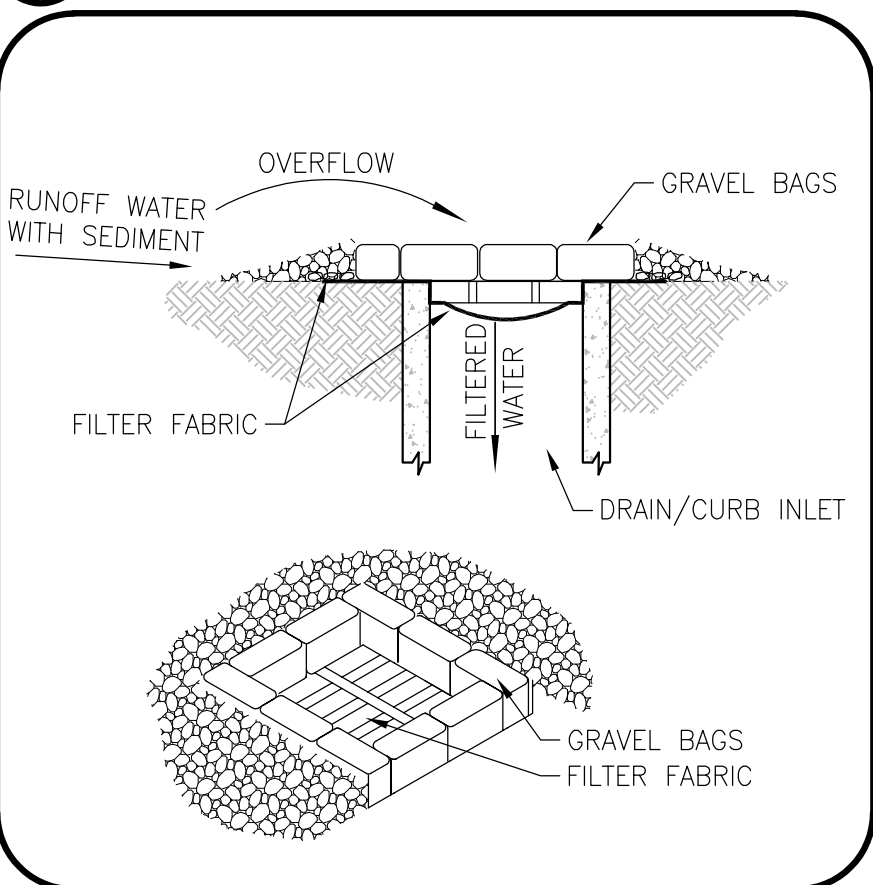
Know what's below.
Call before you dig.

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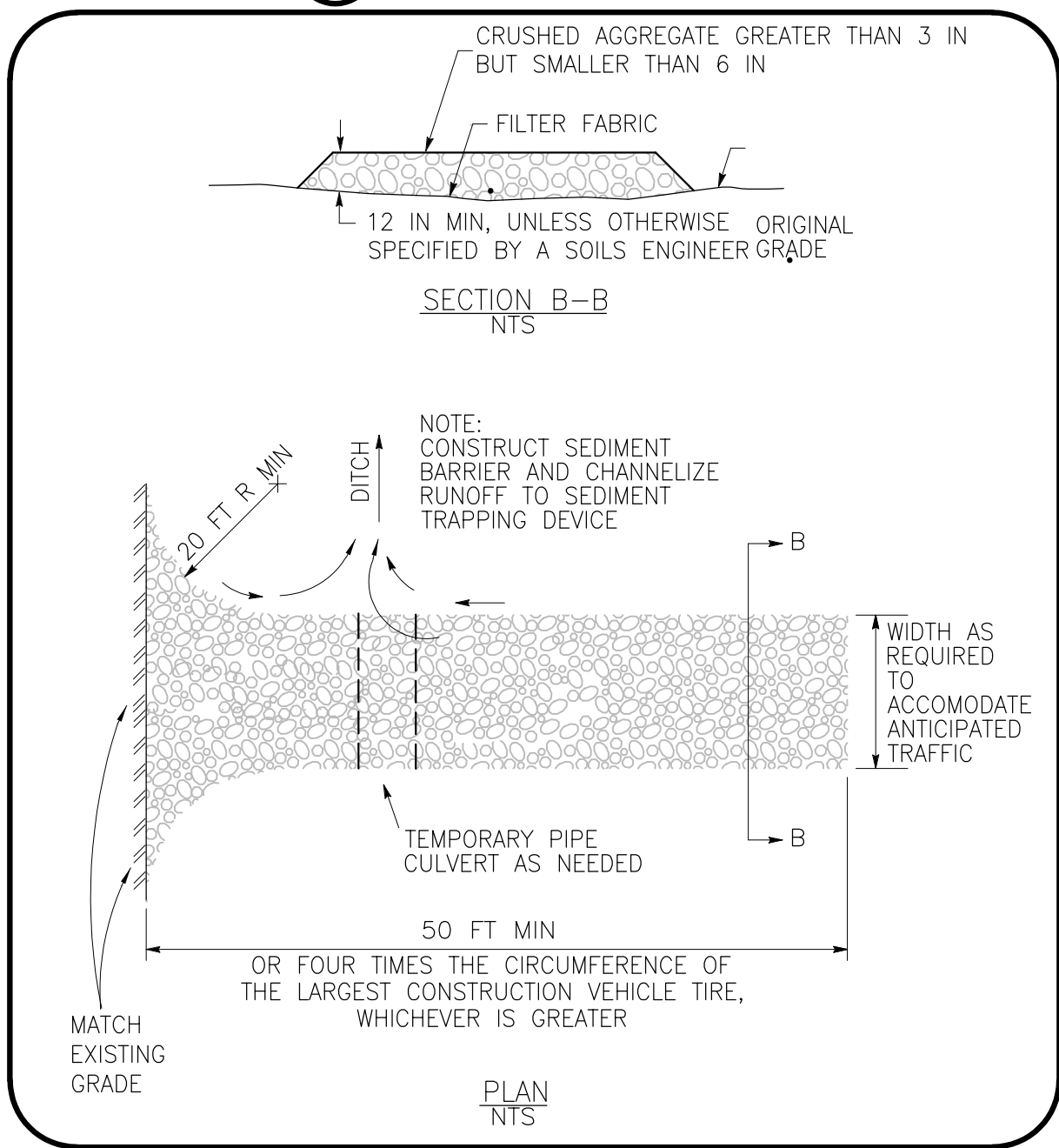
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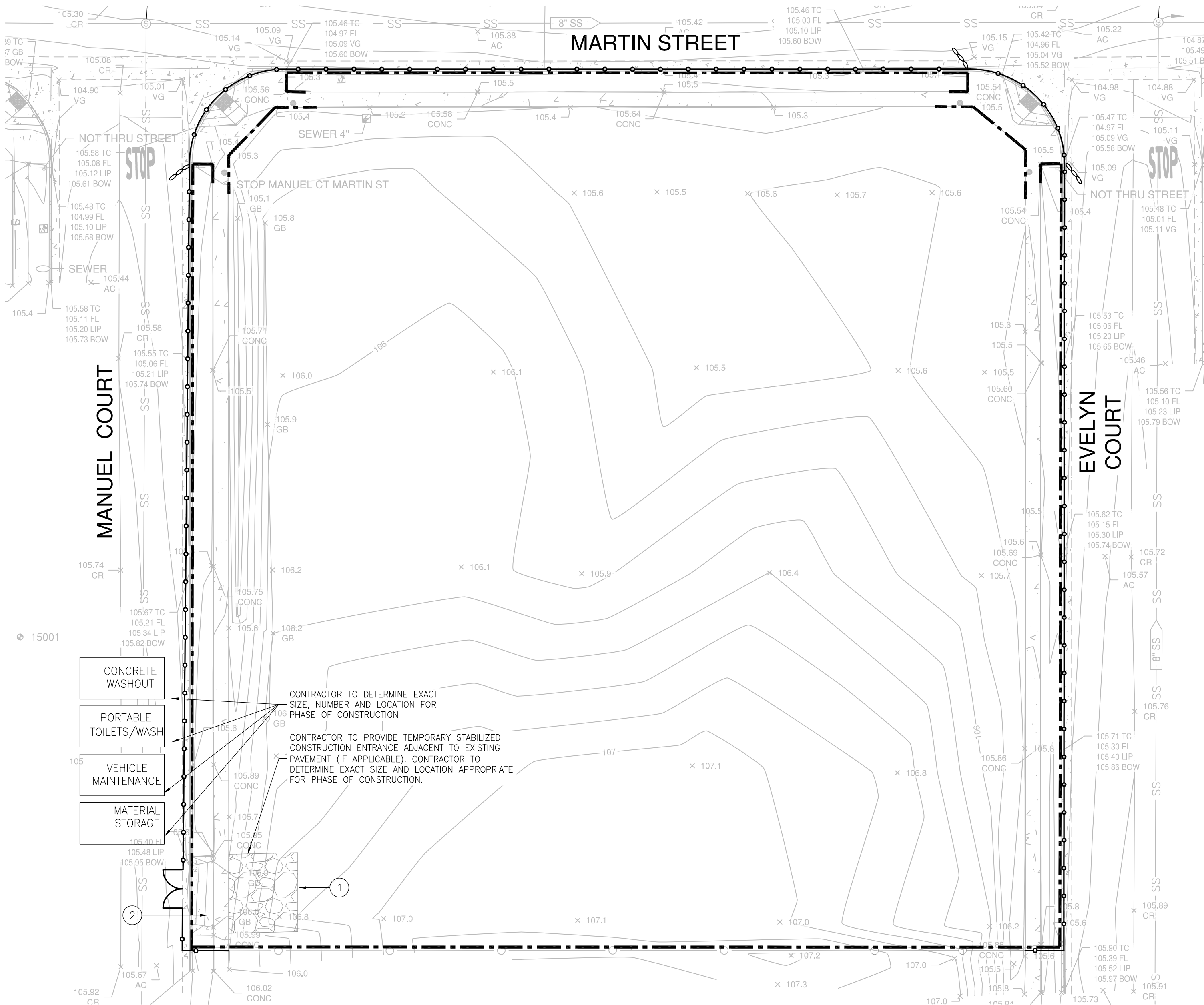
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NOT TO SCALE



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③ STABILIZED CONSTRUCTION ENTRANCE/EXIT
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PLAN REVISIONS		
NO.	DATE	REVISION



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LANDSCAPE IMPROVEMENT PLANS SUNRISE RANCH PARK

LOS BANOS, CALIFORNIA

EROSION CONTROL PLAN

APPROVED:

DESIGNED: MS
DRAWN: MS
CHECKED: CK
SCALE: 1" = 20'
DATE: 06/18/2024
JOB NO.: 41356
FILE NO.: 41356-EC_2024-06-21_NR.D



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L2.0

OF

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LOS BANOS, CALIFORNIA

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DRAWN:	MS
CHECKED:	CK
SCALE:	AS SHOWN
DATE:	06/18/2024
JOB NO.:	41356
FILE NO.:	41356-GR.DWG

18

1. THE PROJECT AREAS SHOULD BE PREPARED FOR GRADING BY REMOVING EXISTING VEGETATION, LARGE ROOTS, DEBRIS, AND OTHER POTENTIALLY DELETERIOUS MATERIALS.
2. EXISTING UTILITY LINES THAT WILL NOT REMAIN IN SERVICE SHOULD BE EITHER REMOVED OR PROPERLY ABANDONED. THE APPROPRIATE METHOD OF UTILITY ABANDONMENT WILL DEPEND UPON THE TYPE, DEPTH, AND LOCATION OF THE UTILITY. RECOMMENDATIONS FOR ABANDONMENT CAN BE MADE AS NECESSARY.
3. THE CONTRACTOR SHALL REQUIRE WATER TRUCKS TO OPERATE IN CONJUNCTION WITH GRADING EQUIPMENT AND APPLICATION OF WATER SHALL BE FREQUENTLY AS IS NECESSARY TO CONTROL DUST AT A MINIMUM OF THREE TIMES A DAY. IF THE DUST IS NOT ADEQUATELY CONTROLLED THROUGH THE APPLICATION OF WATER, GRADING ACTIVITIES WILL BE SUSPENDED AND AN HOURLY WATERING SCHEDULE AND/OR MAXIMUM LIMIT ON THE DAILY NUMBER OF CUBIC YARDS TO BE GRADED WILL BE IMPOSED PRIOR TO THE RESUMPTION OF GRADING. IN ADDITION, ALL GRADING ACTIVITIES DURING PERIODS OF HIGH WINDS (OVER 15 MPH) ARE PROHIBITED.
4. ALL ADA PATHS OF TRAVEL SHALL COMPLY WITH THE REQUIREMENTS OF THE LATEST EDITION OF THE CALIFORNIA BUILDING CODE AND SHALL HAVE A MAXIMUM 1.8% CROSS SLOPE AND A MAXIMUM 4.5% RUNNING SLOPE.
5. FEATHER OUT FINISH GRADES TO ENSURE POSITIVE DRAINAGE. MATCH EXISTING GRADES WHERE APPLICABLE. MAX GRADES ON TURF SHALL BE 1:6 (16.6%)
6. SITE GRADING PLAN HAS BEEN DEVELOPED TO BALANCE ALL SOIL ON-SITE. MINIMAL OFF-HAUL IS EXPECTED. SHOULD IT BECOME APPARENT DURING GRADING OPERATIONS THAT EXCESS SOIL IS UNAVAILABLE, THE CONTRACTOR SHALL NOTIFY THE LANDSCAPE ARCHITECT FOR DIRECTION PRIOR TO COMPLETING THE GRADING OPERATION. FAILURE TO DO SO WILL PLACE RESPONSIBILITY OF IN-FILL/OFF-HAUL ON CONTRACTOR

4'-0" SUB-SURFACE SUMP DRAIN,
UNLESS OTHERWISE NOTES - SEE DETAIL
X ON SHEET L9.X

UNDERGROUND UTILITY LABEL AND
DIRECTION.

SWALE

LIMIT OF WORK (LOW)

APPROXIMATE LOCATION OF CONCRETE
SUB-BASE AT PIP RUBBER SURFACING,
CONTRACTOR SHALL VERIFY IN FIELD
PRIOR TO INSTALLATION - SEE DETAIL 10
ON SHEET L9.0

- ① DEEPENED CONCRETE EDGE AT PLAYGROUND, SEE DETAIL 3 ON SHEET L9.0
- ② WALL FOOTING BELOW GRADE, SEE DETAIL 1 ON SHEET L9.2
- ③ FINISHED SURFACE OF PIP RUBBER SURFACING AND ENGINEERED WOOD FIBER TRANSITION, SEE DETAILS 7 & 10 ON SHEET L9.0
- ④ TOE OF SLOPE
- ⑤ HILLSIDE PLAY SHAPE, SEE DETAIL 11 ON SHEET L9.0

BW	BACK OF WALK
BR	BOTTOM OF RAMP
C	CONCRETE
C(R)	CONCRETE RAMP
CONF	CONFORM TO EXISTING
DI	DRAIN INLET
E	EXISTING
EX	EXISTING
FC	FLUSH CURB
FG	FINISH GRADE
FL	FLOW LINE
FS	FINISH SURFACE
FSB	FINISH-SUB-SURFACE
GS	GRADE BREAK
HL	HOLD LEVEL
HP	HIGH POINT
INV	INVERT
LP	LOW POINT
RM	RIM OF DRAIN LINE
RS	TOP OF RUBBER SURFACE
TC	TOP OF CURB
TF	TOP OF FOOTING
TFC	TOP OF FLUSH CURB
TR	TOP OF RAMP
TSD	TOP OF SUMP DRAIN
TW	TOP OF WALL
UTB	UTILITY BOX
WF	TOP OF WOOD FIBER PLAY SURFACE



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* SUMMARY IS PROVIDED FOR BIDDING PURPOSES ONLY. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY ACTUAL CUT/FILL QUANTITIES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO "OFF-HAUL" ANY EXCESS SOIL FROM THE SITE AT THE CONTRACTOR'S EXPENSE. SHOULD SIGNIFICANT DIFFERENCES BETWEEN DRAWINGS AND CONTRACTOR FINDINGS OCCUR, CONTRACTOR SHALL BRING THIS TO THE ATTENTION OF THE CITY FOR DIRECTION.

PLAYGROUND ENLARGEMENT GRADING PLAN

APPENDIX D

BMP INSPECTION CHECKLIST

APPENDIX E

QUALIFYING RAIN EVENT FORECASTS, INSPECTIONS, CHAIN OF CUSTODY, AND MONITORING FORMS

Risk Level 1,2,3 Visual Inspection Field Log Sheet						
Date and Time of Inspection:				Report Date:		
Inspection Type:	☐ Weekly	☐ Before predicted rain	☐ During rain event	☐ Following qualifying rain event	☐ Contained stormwater release	☐ Quarterly non-stormwater
Site Information						
Construction Site Name: Santana Ranch Park						
Construction stage and completed activities:					Approximate area of exposed site:	
Weather and Observations						
Date Rain Predicted to Occur:				Predicted % chance of rain:		
Estimate storm beginning: _____ (date and time)		Estimate storm duration: _____ (hours)		Estimate time since last storm: _____ (days or hours)		Rain gauge reading: _____ (inches)
Observations: If yes identify location						
Odors		Yes ☐ No ☐				
Floating material		Yes ☐ No ☐				
Suspended Material		Yes ☐ No ☐				
Sheen		Yes ☐ No ☐				
Discolorations		Yes ☐ No ☐				
Turbidity		Yes ☐ No ☐				
Site Inspections						
Outfalls or BMPs Evaluated			Deficiencies Noted			
(add additional sheets or attached detailed BMP Inspection Checklists)						
Photos Taken:	Yes ☐	No ☐	Photo Reference IDs:			
Corrective Actions Identified (note if SWPPP/REAP change is needed)						
Inspector Information						
Inspector Name:				Inspector Title:		
Signature:					Date:	

Non-Visible Pollution Monitoring Log

Approximate date/time of pollutant breach/leak: _____.

Weather at time of breach: _____.

Runoff Discharge: ☐ yes ☐ no

Description non-visible pollutant event (material, substance, construction event, etc.):

Immediate corrective action taken:

Contaminated Sample ID: _____ Date: _____ Sample Description (sample size, odors, etc.):

Non-contaminated Sample ID: _____ Date: _____ Sample Description (sample size, odors, etc.):

Required testing parameters per potential source pollutants (list all applicable):

Analytical Data:

Sample ID	Date of analysis	Method (field, laboratory, instrument name)	Measurement (units)	Detection limits

Corrective actions needed to prevent non-visible pollution:

Date corrective actions implemented and personnel responsible:



CHAIN OF CUSTODY

Page 1 of 1

Work Order No.

Client Name		Project Name		Requested Analysis										ISO Requirements		Requested Turn Around	
Client Contact		Project Number												☐ Total COD ☐ Spectrocolor ☐ DNM upload ☐ CADD ☐ Regulator ☐ State Specify:		Rush requests subject to additional charge. Rush requests subject to lab approval.	
Address		Project Description															
City		PO Number															
State/Zip		Shipped By															
Phone		Fax												Matrix		☐ Sediment ☐ Other	
Sampler		Sampler Signature		☐ Potable ☐ Soil ☐ Waste W ☐ Surface				Global ID		Expedited (days)							
Chau Tran								System ID		Due Date							

Laboratory Work Order No. / ID		Sampled Date	Sampled Time	Sample Type Code	Matrix Code	Container Count	PRIMARY WORK LOG										Sample Condition Temperature	Laboratory Work Order No. / Sample ID

Relinquished By	Date/Time	Received By	Date/Time	SAMPLING	Special Instruction
Relinquished By	Date/Time	Received By	Date/Time	COMPOSITE SAMPLER SETUP:	
Relinquished By	Date/Time	Received By	Date/Time	Sampler (s) _____ Date Setup _____ Time _____	
Cooler Numbers and Temperatures Default Cooler at 4 °C				COMMENTS: Matrix Codes: W=Surface Water Preserve Codes: 1=Store cool at 4°C Cont. Codes: 1=800 Bottle	

APPENDIX F

Weather Reports

Appendix G – SWPPP Training Log

Storm Water Pollution Prevention Training Log

Project Name: Sunrise Ranch Park
Project Location: Manuel Court and Martin Street
Instructor's Name(s):
Instructor's Title(s):

Course Location: _____ Date: _____

Course Length (hours): _____

Storm water Training Topic: (check as appropriate)

- ☐ Erosion Control BMPs ☐ Emergency Procedures
- ☐ Sediment Control BMPs ☐ Good Housekeeping BMPs
- ☐ Non-Storm water BMPs

Specific Training Objective: _____

Attendee Roster: (attach additional pages as necessary)

No.	Name of Attendee	Company
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

APPENDIX H

ANNUAL REPORTS & NUMERIC ACTION LEVEL EXCEEDANCE REPORTS

APPENDIX I

CONSTRUCTION GENERAL PERMIT & ATTACHMENT C

CALIFORNIA STATE WATER RESOURCES CONTROL BOARD
1001 I Street Sacramento, CA 95814
<https://www.waterboards.ca.gov>

**NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
GENERAL PERMIT FOR STORMWATER DISCHARGES ASSOCIATED WITH
CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES
(GENERAL PERMIT)**

ORDER WQ 2022-0057-DWQ
NPDES NO. **CAS000002**

This Order was adopted by the State Water Resources Control Board on:	September 8, 2022
This Order shall become effective on:	September 1, 2023
The statewide programmatic permitting option per Section III.B.4 of this Order shall become effective on:	December 17, 2022
This Order shall expire on:	August 31, 2028

IT IS HEREBY ORDERED that this Order supersedes Order 2009-0009-DWQ as amended by Order 2010-0014-DWQ and 2012-0006-DWQ except for: (1) the requirement to submit annual reports by September 1, 2023, (2) enforcement purposes, and (3) as set forth in Section III.C of this Order. The discharger shall comply with the requirements in this Order to meet the provisions contained in Division 7 of the California Water Code (commencing with § 13000) and regulations adopted thereunder, and the provisions of the federal Clean Water Act and regulations and guidelines adopted thereunder.

IT IS ALSO HEREBY ORDERED that on or after December 17, 2022, a discharger deploying Executive Order N-73-20 may obtain regulatory coverage through the statewide programmatic permitting option in Section III.B.4 under Order 2009-0009-DWQ as amended by Orders 2010-0014-DWQ and 2012-0006-DWQ until September 1, 2023.

I, Jeanine Townsend, Clerk to the Board, do hereby certify that this Order with all attachments is a full, true, and correct copy of an Order adopted by the State Water Resources Control Board, on September 8, 2022.

AYE: Chair E. Joaquin Esquivel
Board Member Sean Maguire
Board Member Laurel Firestone
Board Member Nichole Morgan

NAY: None

ABSENT: Vice Chair Dorene D'Adamo

ABSTAIN: None

Courtney Tyler for
Jeanine Townsend
Clerk to the Board

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LIST OF ATTACHMENTS

Attachment A	Acronyms and Terms
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Attachment D.1	Risk Determination Worksheet
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Attachment E	Linear Underground and Overhead Project Requirements
Attachment E.1	Linear Underground and Overhead Project Area or Segment Area Type Determination
Attachment E.2	Permit Registration Document Requirements for Linear Underground and Overhead Projects
Attachment F	Active Treatment System Requirements
Attachment G	Requirements for the Use of Passive Treatment Technologies
Attachment H	Total Maximum Daily Load Implementation Requirements Applicable to Construction Stormwater Discharges
Attachment I	Requirements for Dischargers Granted a California Ocean Plan Exception for Discharges to Areas of Special Biological Significance
Attachment J	Dewatering Requirements

I. FINDINGS

The State Water Resources Control Board (State Water Board) finds that:

1. The Federal Water Pollution Control Act, also referred to as the Clean Water Act, prohibits certain discharges of stormwater containing pollutants to waters of the United States except in compliance with a National Pollutant Discharge Elimination System (NPDES) permit (Title 33 United States Code (U.S.C.) §§ 1311 and 1342(p); also referred to as Clean Water Act §§ 301 and 402(p)). The United States Environmental Protection Agency (U.S. EPA) promulgates federal regulations to implement the Clean Water Act's mandate to control pollutants in stormwater runoff discharges. (Title 40 Code of Federal Regulations (CFR) Parts 122, 123, and 124). The federal statutes and regulations require discharges to waters of the United States comprised of stormwater associated with construction activity to obtain NPDES permit coverage (except operations that result in disturbance of less than one acre of total land area and that are not part of a larger common plan of development or sale). Construction activity includes, but is not limited to, clearing, demolition, grading, excavation, and other land disturbance activities. The NPDES permit shall require implementation of Best Available Technology Economically Achievable (BAT) and Best Conventional Pollutant Control Technology (BCT) to reduce or eliminate pollutants in stormwater runoff. The NPDES permit shall also include any additional requirements necessary to achieve applicable water quality standards.
2. Consistent with Water Code, § 13374, this NPDES permit also serves as waste discharge requirements for discharges of pollutants in stormwater runoff (stormwater discharges) associated with construction and land disturbance activities and is hereinafter referred to as General Permit.
3. A "discharger" is a person, as defined in Water Code § 13050(c), which includes companies and governmental bodies, subject to this General Permit who is responsible for compliance with this General Permit. The discharger designates the Legally Responsible Person(s) to serve as a primary signatory when required to sign, certify, and submit documents or information for this General Permit. The Legally Responsible Person(s) may also designate a Duly Authorized Representative(s) to sign, certify, and submit documents or information for this General Permit. "Discharger" and the designated "Duly Authorized Representative" are further defined in Attachment B of this General Permit.
4. This General Permit regulates discharges to waters of the United States from stormwater and authorized non-stormwater associated with construction activity from sites that disturb one or more acres of land surface, or that are part of a common plan of development or sale that disturbs more than one acre of land surface.
5. This General Permit regulates discharges to waters of the United States from stormwater and authorized non-stormwater associated with construction activities

from all linear underground and overhead projects resulting in the disturbance of greater than or equal to one acre (Attachment E).

6. This General Permit does not preempt or supersede the authority of local stormwater management agencies to prohibit, restrict, or control stormwater discharges to municipal separate storm sewer systems or other watercourses within their jurisdictions.
7. This action to adopt a general NPDES permit is exempt from the provisions of Chapter 3 of the California Environmental Quality Act (Public Resources Code § 21100, et seq.), pursuant to § 13389 of the California Water Code.
8. Regional Water Quality Control Boards (Regional Water Boards) establish water quality standards in water quality control plans. The State Water Board establishes water quality standards in various statewide water quality control plans, including the California Ocean Plan and the forthcoming Inland Surface Waters, Enclosed Bays, and Estuaries of California Plan. U.S. EPA establishes water quality standards in the National Toxic Rule and the California Toxic Rule.
9. Pursuant to 40 Code of Federal Regulations § 131.12 and State Water Board Resolution No. 68-16 (antidegradation policy), which incorporates applicable requirements of § 131.12, in high quality waters, discharges may not unreasonably affect beneficial uses, result in water quality less than the quality specified by water quality objectives, or cause a pollution or nuisance, except as allowed under the antidegradation policy. The federal antidegradation policy requires that “existing instream uses and the level of water quality necessary to protect the existing uses” are maintained and protected. If the baseline quality of a waterbody for a given constituent “exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected” through the requirements of this Order unless the State Water Board makes findings that: (1) any lowering of the water quality is “necessary to accommodate important economic or social development in the area in which the waters are located”; (2) “water quality adequate to protect existing uses fully” is assured; and (3) “the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control” are achieved. For high quality waters, Resolution No. 68-16 requires findings that any lowering of water quality is “consistent with the maximum benefit to the people of the State” and “will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies” and further that the discharge is subject to “waste discharge requirements which will result in the best practicable treatment or control of the discharge.”
10. The State Water Board finds that the permitted discharges authorized by this Order are consistent with the antidegradation provision of 40 CFR §131.12 and State Water Board Resolution No. 68-16, as set forth in Section I.H.2 in the Fact Sheet.

11. This General Permit serves as an NPDES permit in compliance with Clean Water Act § 402 and will be effective on September 1, 2023, except for the statewide programmatic permitting option per Section III.B.4 of this Order which will go into effect on December 17, 2022, provided the Regional Administrator of the U.S. EPA has no objection. If the U.S. EPA Regional Administrator objects to its issuance, this General Permit will not become effective until such objection is withdrawn.
12. The Regional Water Boards and the State Water Board, collectively referred to as the Water Boards, shall enforce the provisions herein following adoption and upon the effective date of this General Permit.
13. Stormwater discharges from dredge spoil placement that occur outside of waters of the state (upland sites) and that disturb one or more acres of land surface from construction activity are covered by this General Permit. This General Permit does not cover the discharge of dredged or fill material to waters of the state. Construction projects that include the discharge of dredged or fill material to waters of the state should contact the applicable Regional Water Board to obtain authorization for the discharge of dredged or fill material to waters of the state.
14. The discharge of dredged or fill material to a water of the United States is regulated by the United States Army Corps of Engineers under Clean Water Act § 404, and by the Water Boards under Clean Water Act § 401. The discharge of dredged or fill material to a water outside of federal jurisdiction may be regulated by the Water Boards under the Porter-Cologne Water Quality Control Act. This General Permit does not authorize discharges of fill or dredged material regulated by the U.S. Army Corps of Engineers under CWA § 404 and does not constitute a waiver of water quality certification under CWA § 401.
15. Compliance with requirements contained in this General Permit does not supersede or constitute compliance with other regulatory requirements also applicable to discharges regulated by this General Permit, including waste discharge prohibitions in regional and statewide water quality control plans.
16. The State Water Board heard and considered all comments and testimony in a public hearing on August 4, 2021, as publicly noticed in accordance with state and federal laws and regulations. The State Water Board has prepared written responses to all significant comments.
17. The Homeland Security Act of 2002 (U.S. 116 STAT. 2135 and Title 6 U.S. Code Chapter 1 § 101) requires any information provided to the Water Boards per a regulatory action taken by the Water Boards shall comply with the Homeland Security Act and other federal law that address security in the United States; the discharger should not submit any information that does not comply.
18. The discharger is required to comply with this General Permit's conditions for all discharges associated with stormwater from construction activity and authorized non-stormwater discharges by this General Permit or another NPDES permit

issued by the State Water Board or a Regional Water Board. All other discharges are prohibited by this General Permit.

19. Unauthorized non-stormwater discharges are prohibited, including improper dumping, spills, or leakage from storage tanks or transfer areas. Non-stormwater discharges may contribute significant pollutant loads to receiving waters.
20. All discharges which contain a hazardous substance in excess of reportable quantities established in 40 Code of Federal Regulations §§ 117.3 and 302.4, are prohibited unless a separate NPDES permit has been issued to regulate those discharges.
21. Stormwater that is exposed to by-products and waste products resulting from demolition activities may transport and discharge pollutants off-site and into receiving waters.
22. In 2008, the State Water Board and the California Stormwater Quality Association (CASQA) led a group of stakeholders in developing and establishing the Construction General Permit Training Team (CGPTT). Subsequently, the CGPTT developed the training program and certification process for Qualified Stormwater Pollution Prevention Plan (SWPPP) Developer (QSD) and the Qualified SWPPP Practitioner (QSP) conducting work required by this General Permit. In 2010, CASQA and the State Water Board entered into a Memorandum of Agreement to document their respective understandings, roles, and responsibilities for the implementation of the QSD/QSP training program. The Memorandum of Agreement notes that the CASQA QSD/QSP Training Program constitutes a State Water Board-approved training course pursuant to the Construction Stormwater General Permit. The Memorandum of Agreement also documents that CASQA will continue to lead the QSD/QSP training program, with guidance from the CGPTT.
23. Per the Memorandum of Agreement, CASQA is responsible for qualifying and overseeing Trainers of Record who deliver the official QSD/QSP training program curricula in a manner consistent with the standards established by the CGPTT.
24. All California professional engineering, land surveying, and geology work is licensed by the Board for Professional Engineers, Land Surveyors, and Geologists.¹ Pursuant to the Professional Engineers Act (Bus. and Prof. Code § 6700, et seq.), all engineering work is required to be performed by a California licensed professional engineer. Pursuant to the Profession Land Surveyor's Act (Bus. and Prof. Code §§ 8700 – 8805), all land surveying work is required to be performed by a California licensed profession land surveyor. Pursuant to the Professional Geologist and Geophysicist's Act (Bus. and Prof. Code §§ 7800 –

¹ [Department of Consumer Affairs, California Board for Professional Engineers, Land Surveyors, and Geologists website](https://www.bpelsg.ca.gov/) <<https://www.bpelsg.ca.gov/>> [as of July 2022]

7887), all geological work is required to be performed by a California licensed professional geologist.

25. Precipitation events can occur at any time of the year in California. On-site stormwater management is necessary throughout the entire year to ensure sites implement adequate erosion and sediment controls prior to the onset of a precipitation event, even if construction is planned only during the typically dry season.
26. Soil particles smaller than 0.02 millimeters (mm) (i.e., finer than medium silt) do not settle easily using conventional measures for sediment control (i.e., sediment basins). Fine particles discharged into surface waters cause downstream impacts to beneficial uses in the receiving water. Actively treating construction stormwater discharges with properly operated and maintained active treatment systems can reduce the turbidity level and sediment concentration in the discharge to levels that comply with receiving water limitations.
27. The State Water Board convened a Blue-Ribbon Panel (Panel) of stormwater experts that submitted a report entitled "The Feasibility of Numeric Effluent Limits Applicable to Discharges of Stormwater Associated with Municipal, Industrial and Construction Activities," dated June 19, 2006. The Panel concluded that numeric effluent limitations or numeric action levels are technically feasible to regulate construction stormwater discharges. The Panel concluded that numeric effluent limitations are feasible for discharges from sites that utilize an active treatment system. The Panel also concluded that numeric action levels are likely to be more commonly feasible. The previous permit (Order 2009-0009-DWQ, as amended by Orders 2010-0014-DWQ and 2012-0006-DWQ) includes numeric action levels for pH and turbidity, and specific numeric effluent limitations for active treatment system discharges. The Panel was not asked to address requirements specific to the implementation of Total Maximum Daily Loads (TMDL) with assigned waste load allocations for construction stormwater sources.
28. The purpose of numeric action levels and associated monitoring requirements is to provide operational information regarding the performance of the site control measures used to minimize the discharge of pollutants and to protect receiving water beneficial uses from the adverse effects of construction-related stormwater and authorized non-stormwater discharges. Upon exceedance of a numeric action level, the discharger must take necessary corrective actions, including but not limited to maintenance, replacement, and/or installation of new best management practices. This General Permit relies on dischargers to implement an iterative process for best management practice to protect water quality. Failure to implement corrective actions in response to a numeric action level exceedance is a violation of this General Permit.
29. This General Permit requires compliance with receiving water limitations based on water quality standards established in regional or statewide water quality control plans. One of the receiving water limitations requires that construction

stormwater discharges and authorized non-stormwater discharges not cause or contribute to an exceedance of applicable water quality standards. Water quality standards apply to the quality of the receiving water, not the quality of the construction stormwater discharge. Therefore, compliance with the receiving water limitations generally cannot be determined solely by the effluent water quality characteristics. If any discharger's stormwater discharge causes or contributes to an exceedance of water quality standards, that discharger must implement additional BMPs or other control measures in order to attain compliance with the receiving water limitation. Compliance with water quality standards may, in some cases, require dischargers to implement controls that are more protective than controls implemented solely to comply with the technology-based requirements in this General Permit.

30. A Total Maximum Daily Load is the sum of the allowable loads of a single pollutant from all contributing point sources (waste load allocations) and non-point sources (load allocations), plus the contribution from background sources (40 Code of Federal Regulations § 130.2(i)). Discharges of stormwater from construction activities are considered point source discharges, and therefore must comply with NPDES permit requirements translated to be "consistent with the assumptions and requirements of any available waste load allocation for the discharge prepared by the state and approved by U.S. EPA pursuant to 40 Code of Federal Regulations § 130.7" (40 Code of Federal Regulations § 122.44 (d)(1)(vii)). In addition, Water Code § 13263, subdivision (a), requires that waste discharge requirements implement any relevant water quality control plans. Many TMDLs in water quality control plans include implementation requirements that may be translated into General Permit requirements and TMDL-specific numeric action levels and numeric effluent limitations.
31. Areas of Special Biological Significance are defined in the California Ocean Plan as "those areas designated by the State Water Board as ocean areas requiring protection of species or biological communities to the extent that alteration of natural water quality is undesirable." The California Ocean Plan prohibits the discharge of waste to Areas of Special Biological Significance unless identified in a State Water Board-approved exception.
32. The California Ocean Plan authorizes the State Water Board to grant an exception to California Ocean Plan provisions where the State Water Board determines that the exception will not compromise protection of ocean waters for beneficial uses and the public interest will be served.
33. On March 20, 2012, the State Water Board adopted Resolutions 2012-0012 and Resolution 2012-0031, which contain exceptions to the California Ocean Plan for specific discharges of stormwater and non-point sources. This resolution also contains the special protections that are to be implemented for those discharges to Areas of Special Biological Significance.
34. Dischargers are only allowed to discharge to an Area of Special Biological Significance when in compliance with Areas of Special Biological Significance-

specific requirements in a State Water Board-provided exception to the California Ocean Plan granted to the specific discharger.

35. On August 19, 2014, the U.S. EPA adopted regulations requiring all NPDES permits to include requirements to implement sufficiently sensitive test methods. This General Permit requires all laboratory analyses to be sufficiently sensitive and conducted according to test procedures under 40 Code of Federal Regulations Part 136. All analytical results less than the minimum level (reporting limit), as reported by the laboratory, will be assigned a value of zero (0) for any calculations required by this permit (e.g., numeric action level and numeric effluent limitation exceedance determinations), so long as a sufficiently sensitive test method was used as evidenced by the reported method detection limit and minimum level.
36. Specific types of passive treatment used in combination with other best management practices (BMPs) can prevent or reduce the discharge of fine particles from certain construction activities when implemented correctly.
37. Passive treatment is the application of natural or synthetic chemicals and products to reduce turbidity in discharges through coagulation and flocculation. Passive treatment does not rely on computerized, enclosed systems with pumps, filters, and real-time controls. Passive treatment may include pumps where they are necessary to move water around the site. The discharge of chemicals used in passive treatment can potentially cause or contribute to acute and chronic toxicity to aquatic life in receiving waters, potentially resulting in an exceedance of narrative or numeric water quality objectives in regional or statewide water quality control plans.
38. State Water Board Resolution 2005-0006, "Resolution Adopting the Concept of Sustainability as a Core Value for State Water Board Programs and Directing its Incorporation," and Resolution No. 2008-0030, "Requiring Sustainable Water Resources Management," include performance standards for post-construction BMPs. The standards include the use of permanent post-construction BMPs that manage stormwater runoff rates to match pre-construction project site hydrology, and to sustain and ensure the physical structure and biological integrity of aquatic ecosystems in the receiving waters. This "runoff reduction" approach is analogous in principle to low impact development and is proven to protect watersheds and waterbodies from hydrologic-based adverse changes and pollution impacts associated with the post-construction landscape.
39. Linear underground and overhead projects are not subject to post-construction requirements due to the nature of their construction to return project sites to pre-construction conditions.

IT IS HEREBY ORDERED that all dischargers subject to this General Permit shall comply with the following conditions and requirements (including all conditions and requirements as set forth in the Attachments of this Order)²: State Water Board Order 2009-009-DWQ as amended by Orders 2010-0014-DWQ and 2012-0006-DWQ (previous permit) is superseded as of the effective date of this General Permit except for enforcement purposes, the Annual Report required to be submitted by September 1, 2023, and as set forth in Section III.C.

II. SCOPE OF GENERAL PERMIT COVERAGE

II.A. Traditional Construction Activities Subject to this General Permit

This General Permit covers construction projects that include construction or land disturbance activities that result in a disturbance of one or more acres, or less than one acre but are part of a larger common plan of development or sale that totals one or more acres of land disturbance, such as the following:

1. Construction activity that includes, but is not limited to, clearing, grading, excavation, stockpiling, and demolition activities that expose or disturb soil.
2. Construction activity related to residential, commercial, or industrial development on lands currently used for agriculture including, but not limited to, the construction of buildings related to agriculture that are considered industrial pursuant to U.S. EPA regulations, such as dairy barns or food processing facilities.
3. Construction activity associated with oil and gas exploration, production, processing, or treatment operations or transmission facilities pursuant to 40 Code of Federal Regulations § 122.26(c)(1)(iii), which:
 - a. Had a discharge of stormwater resulting in the discharge of a reportable quantity for which notification is or was required pursuant to 40 Code of Federal Regulations §§ 117.21 or 302.6 at any time since November 16, 1987;
 - b. Had a discharge of stormwater resulting in the discharge of a reportable quantity for which notification is or was required pursuant to Code of Federal Regulations § 110.6 at any time since November 16, 1987; or
 - c. Contributes to a violation of a water quality standard.

II.B. Traditional Construction Activities Not Subject to this General Permit

This General Permit does not apply to the following construction activity:

1. Routine maintenance. Routine maintenance is defined as activities intended to maintain the original line and grade, hydraulic capacity and/or purpose of

² The attachments are part of this General Permit; the attachments are not separate orders or documents that will be updated independently by the State Water Board.

the facility. This General Permit further defines routine maintenance for road and highway projects as the replacement of the structural section, but not when the activity exposes the underlying soil or erodible subgrade. The road surface and base are not part of the subgrade. As such, those portions of a project that remove the paved road surface and base down to the erodible subgrade and/or underlying soil would not be considered routine maintenance.

2. Disturbances to land surfaces solely related to growing crops or agricultural operations such as disking, harrowing, terracing, and leveling, and soil preparation.
3. Discharges of stormwater from areas on tribal lands; construction on tribal lands is regulated by a federal permit.
4. Discharges of stormwater within the Lake Tahoe Hydrologic Unit. The Lahontan Regional Water Board has adopted its own permit to regulate stormwater discharges from construction activity in the Lake Tahoe Hydrologic Unit. Owners of construction sites in this watershed must apply for the Lahontan Regional Water Board permit rather than the statewide Construction Stormwater General Permit. Construction sites within the Lahontan region must also comply with the Lahontan Region Project Guideline for Erosion Control (R6T-2016-0010).³
5. Construction activity that disturbs less than one acre of land surface, unless part of a larger common plan of development or the sale of one or more acres of disturbed land surface.
6. Construction activity covered by an individual NPDES Permit for stormwater discharges.
7. Construction activity that is subject to the Industrial Stormwater General Permit:
 - a. Landfill operations as described by Standard Industrial Classification (SIC) code 4953. Landfill operators typically enroll under the Construction Stormwater General Permit for initial construction and final closure of the landfill.
 - b. Concrete manufacturers of prefabricated products, ready-mix concrete, or slurries that are delivered to construction sites require enrollment in the Industrial Stormwater General Permit. Examples of this industrial activity are those facilities primarily engaged in manufacturing concrete building blocks and bricks, other concrete products not building blocks and bricks,

3 Lahontan Regional Water Quality Control Board, [Order R6T-2016-0010](https://www.waterboards.ca.gov/lahtontan/water_issues/programs/storm_water/docs/r6t_2016_0010_cgp_combined.pdf) (March 10, 2016), https://www.waterboards.ca.gov/lahtontan/water_issues/programs/storm_water/docs/r6t_2016_0010_cgp_combined.pdf [as of May 20, 2021]

or ready-mix concrete as categorized by Standard Industrial Classification (SIC) codes 3531, 3271, 3272, or 3273. Concrete manufacturing of prefabricated products, ready-mixed concrete, or slurries that are transported from construction sites where mixing occurs and delivered to a separate site require enrollment in the Industrial Stormwater General Permit.

8. Construction activity that discharges to combined sewer systems.
9. Discharges of stormwater identified in Clean Water Act § 402(l)(2), 33 USC § 1342(l)(2) (stormwater runoff from oil, gas, and mining operations) unless the discharge meets the conditions of 40 Code of Federal Regulations § 122.26(c)(1)(iii) as described in this General Permit.
10. Discharges of dredged or fill material to waters of the state. Those portions of the construction project that are located outside of waters of the state or waters of the United States are subject to this General Permit if the non-water portions disturb one or more acres of land.

II.C. Linear Underground and Overhead Projects Subject to this General Permit

1. Linear underground and overhead projects include, but are not limited to conveyance facilities, culverts, pipelines, or other linear corridors for:
 - a. The transportation of any gaseous, liquid, liquescent, and slurry material;
 - b. Cable line or wire for the transmission of:
 - i. Electrical energy; or
 - ii. Communications, including internet, telephone, telegraph, radio, or television messages.
 - c. Ancillary facilities and substructures such as new access roads, helicopter landing zones, laydown yards, staging areas, substations, valve stations, etc. that primarily function as support for linear underground and overhead project construction activities.⁴
2. Construction support activities associated with linear underground and overhead projects include, but are not limited to:
 - a. Activities necessary for the installation of underground and overhead linear facilities (e.g., conduits, substructures, pipelines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment, vegetative management, and associated ancillary facilities); and

⁴ Regional Water Board staff may require, in writing, that the discharger obtain coverage through a traditional construction notice of intent when the construction of ancillary facilities more closely resembles traditional construction activities.

- b. Activities including underground utility mark-out, potholing, concrete and asphalt cutting and removal, trenching, excavating, boring and drilling, access road and pole/tower pad and cable/wire pull station, substructure installation, construction of tower footings and/or foundations, pole and tower installations, pipeline installations, welding, concrete and pavement repair or replacement, and stockpile/borrow locations.

II.D. Linear Underground and Overhead Projects Not Subject to this General Permit

This General Permit does not apply to the following linear underground and overhead project construction activity:

1. Routine maintenance projects. Routine maintenance projects are projects associated with operations and maintenance activities that are conducted on existing lines and facilities and within existing right-of-way, easements, franchise agreements, or other legally binding agreements of the discharger granting access to land. Routine maintenance projects include, but are not limited to projects that are conducted to:
 - a. Maintain the original purpose of the facility or hydraulic capacity;
 - b. Update existing lines⁵ and facilities to comply with applicable codes, standards, and regulations regardless of if such projects result in increased capacity; and/or
 - c. Repair leaks.
2. Routine maintenance does not include construction of new lines or facilities resulting from compliance with applicable codes, standards, and regulations.
3. Routine maintenance projects do not include those areas of maintenance projects that are outside of an existing right-of-way, franchise, easements, or agreements. When a project must secure new areas, those areas may be subject to this General Permit based on the area of disturbed land outside the original right-of-way, easement, or agreement.
4. Linear underground and overhead project construction activity does not include field activities associated with the planning and design of a project (e.g., activities associated with route selection).
5. Tie-ins conducted immediately adjacent to “energized” or “pressurized” facilities by the discharger are not considered construction activities where all other linear underground and overhead project construction activities associated with the tie-in are covered by a Notice of Intent and SWPPP of a third party or municipal agency.

⁵ Update existing lines includes replacing existing lines with new materials or pipes.

III. OBTAINING, REVISING, AND TERMINATING PERMIT COVERAGE

III.A. Obtaining Permit Coverage for Traditional Construction Projects

- III.A.1. The Discharger shall obtain a Waste Discharge Identification (WDID) number prior to the commencement of construction activity by electronically certifying and submitting the following Permit Registration Documents through the State Water Board Stormwater Multiple Application and Report Tracking System (SMARTS)⁶:
- a. Notice of Intent, including Risk Level determination as described in Attachment D.1;
 - b. Site Drawings and Maps;
 - c. Stormwater Pollution Prevention Plan (SWPPP) (see Section IV.O, below);
 - d. Applicable plans, calculations, and other supporting documentation for compliance with existing permitted Phase I or Phase II municipal separate storm sewer system post-construction requirements or the post-construction standards of this General Permit;
 - e. Annual fee per the current 23 California Code of Regulations Chapter 9 fee schedule for NPDES stormwater permits; and
 - f. All applicable additional Permit Registration Document information as required in Attachment D.2 of this General Permit.
- III.A.2. An applicant is considered to have General Permit regulatory coverage and can commence construction activity upon receipt of a WDID number generated by SMARTS. Dischargers shall post their site-specific WDID number in a site location that is viewable to the public or readily available upon request if unable to post publicly.
- III.A.3. In the case of a public emergency that requires immediate construction activities involving one acre or more of land disturbance, a discharger shall submit a brief description of the emergency construction activity to the applicable Regional Water Board within five calendar days of the onset of site construction. The discharger shall then submit the required Permit Registration Documents through SMARTS within 30 calendar days of commencing site activity.
- III.A.4. Failure to obtain General Permit coverage for stormwater and non-stormwater discharges covered by this General Permit to waters of the United States is a violation of the Clean Water Act and the California Water Code.

⁶ Dischargers are required to have a signed original Electronic Authorization Form on file with the State Water Board for each organization in SMARTS.

III.B. Obtaining Permit Coverage for Linear Underground and Overhead Projects

The discharger for a linear underground and overhead project shall designate a Legally Responsible Person for each of its WDIDs numbers. The discharger is responsible for enrollment under and compliance with this General Permit. The Legally Responsible Person, as defined in Attachment B of this General Permit, shall fulfill the electronic signature and certification requirements to obtain General Permit coverage (see Section VI.H, Electronic Signature and Certification Requirements.)

- III.B.1. A discharger for a linear underground and overhead project shall obtain General Permit coverage under one or more applications submitted through SMARTS, per the requirements in Attachment E of this General Permit.
- III.B.2. The Legally Responsible Person shall electronically certify and submit the following applicable Permit Registration Documents through SMARTS⁷ and obtain a WDID number prior to the commencement of any construction activities.
 - a. Notice of Intent, including linear underground and overhead project type determination as described in Attachment E.1;
 - b. Site-specific Stormwater Pollution Prevention Plan (SWPPP), Drawings, and Maps (see Section IV.O, below);
 - c. Annual fee per the current 23 California Code of Regulations Chapter 9 fee schedule for NPDES stormwater permits; and
 - d. All applicable additional Permit Registration Document information as required in Attachment E.2 of this General Permit.
- III.B.3. Regulatory Coverage for linear underground and overhead project segments
 - III.B.3.a. The discharger may separate a contiguous linear underground and overhead project into separately regulated segments. Linear underground and overhead project segments may consist of different risk types.
 - III.B.3.b. The discharger shall include a clear description in the Permit Registration Documents regarding how each segment relates to the overall linear underground and overhead project by identifying one or more of the following descriptions:
 - i. The segments are managed by separate contractors;
 - ii. The segments are constructed during distinct project phases; or
 - iii. The segments are located in different topography, watersheds, or jurisdictional boundaries.

⁷ Dischargers are required to have a signed original Electronic Authorization Form on file with the State Water Board for each organization in SMARTS.

- III.B.3.c. Dischargers with corresponding linear underground and overhead project segments that cross Regional Water Board(s) boundaries (e.g., different segments of same project located within different Regional Water Board jurisdictions) must file separate Permit Registration Documents.
- III.B.4. Programmatic Permitting Regulatory Coverage for linear underground and overhead projects
 - III.B.4.a. A discharger may submit one Notice of Intent requesting regional programmatic General Permit coverage for multiple non-contiguous linear underground and overhead projects, if the projects:
 - i. Are located within one Regional Water Board jurisdiction;
 - ii. Are a group of projects of similar scopes with common construction activities; and
 - iii. Have the same Legally Responsible Person.
 - III.B.4.b. Effective December 17, 2022, a discharger deploying Executive Order N-73-20, per the requirements and due dates of the executive order, or amendments therein, may submit one Notice of Intent requesting statewide programmatic General Permit coverage for multiple non-contiguous linear underground and overhead broadband projects, where the installation of the utilities is outside of a construction project that is otherwise regulated under this General Permit.
 - III.B.4.b.i. A discharger deploying Executive Order N-73-20 may apply for a statewide programmatic permit for regulatory coverage under Order 2009-0009-DWQ (as amended by Orders 2010-0014-DWQ and 2012-0006-DWQ), from December 17, 2022 until September 1, 2023, by submitting the information required by Attachment E.2.
 - III.B.4.c. Linear underground and overhead project dischargers with programmatic permitting coverage shall submit, prior to the commencement of any construction activities for each non-contiguous site, a:
 - i. Common SWPPP with the Notice of Intent covering all the activities common to the projects; and
 - ii. Linear Construction Activity Notification for each site describing site-specific information in accordance with Attachment E.2, Section II.A.2.
- III.B.5. An applicant is considered to have General Permit regulatory coverage and may commence construction activity upon receipt of a WDID number generated by SMARTS Dischargers shall post the project-specific WDID number in a site location that is visible to the public or readily available upon request if unable to post publicly.

III.C. Regulatory Coverage under the Previous Permit

- III.C.1. Dischargers that obtain coverage under State Water Board Order 2009-0009-DWQ, as amended by Orders 2010-0014-DWQ and 2012-0006-DWQ, (previous permit) prior to the effective date of this permit, may continue coverage under the previous permit until its regulated project(s) receive an approved Notice of Termination from the Regional Water Board, up to two years after the effective date of this General Permit. Two years after September 1, 2023, all existing Notices of Intent subject to the previous permit will be administratively terminated.
- III.C.1.a. A discharger continuing regulatory coverage under the previous permit cannot increase a project's disturbed acreage through the Change of Information process, on or after the effective date of this General Permit; the discharger must submit a Notice of Intent for coverage under this General Permit for the increase in disturbed acreage.
- III.C.2. Dischargers with the previous permit's Small Construction Rainfall Erosivity waiver may continue to operate under a project's active waiver until it expires. Waivers granted under the previous permit cannot be modified or extended.
- III.C.3. Dischargers that submit a Notice of Termination for previous permit termination up to two years after the effective date of this General Permit and receive Notice of Termination approval from the Regional Water Board are not subject to this General Permit (unless the discharger subsequently submits new Permit Registration Documents).
- III.C.4. Dischargers with coverage under the previous permit that need regulatory coverage after September 1, 2025 under this General Permit, shall submit, in SMARTS, the following items by August 31, 2025:
 - a. A certification of the discharger's intent to obtain regulatory coverage under this General Permit;
 - b. A revised Notice of Intent and other Permit Registration Documents, revised to address new or changed requirements per this General Permit, as applicable; and
 - c. The applicable fee.

III.D. Small Construction Rainfall Erosivity Waiver

- III.D.1. Dischargers are eligible for the Small Construction Rainfall Erosivity waiver (waiver) if:
 - a. The site is between one and five acres; and
 - b. The construction activity will take place during a period when the calculated rainfall erosivity factor is less than five.

- III.D.2. Dischargers with small sites that are part of a larger common plan of development, or dischargers that have programmatic permit coverage, do not qualify for a waiver unless the entire project qualifies for a waiver.
- III.D.3. To request a waiver, the Legally Responsible Person shall submit a waiver application through SMARTS, and pay the appropriate fee to the State Water Board. If approved by the State Water Board, SMARTS will electronically provide the discharger with the waiver and a unique waiver identification number. The waiver is effective on the date the waiver identification number is issued and valid between the construction start and end dates, as entered in the waiver application.
- III.D.4. A discharger qualifying for a waiver shall obtain a waiver identification number prior to starting any construction activities regulated by this General Permit.
- III.D.5. A waiver is valid only if the correct start and end dates of construction activities are entered (and updated if necessary) through the Change of Information process in SMARTS.
- III.D.6. The discharger may revise an original construction start date through the Change of Information process in SMARTS and shall provide documentation demonstrating the project had not started on the date originally submitted through SMARTS.
- III.D.7. The discharger shall update the project end date through the Change of Information process in SMARTS prior to expiration of the waiver if the project completion date is anticipated to extend past the waiver expiration date. If the updated project end date results in a rainfall erosivity factor of five or greater, the discharger shall obtain coverage under this General Permit. If the discharger fails to update the project end date prior to expiration of waiver, they shall immediately obtain coverage under this General Permit.
- III.D.8. The discharger shall post the unique waiver identification number in a site location that is visible to the public or readily available upon request if unable to post publicly.
- III.D.9. A waiver does not provide General Permit coverage. Dischargers with a waiver are not required to comply with post-construction, sampling, monitoring, or other SWPPP requirements in this General Permit.
- III.D.10. Regional Water Board staff may terminate a waiver if the Regional Water Board staff determines the discharge of stormwater runoff causes or contributes to an exceedance of a water quality standard or violates a prohibition in an applicable regional or statewide water quality control plan. The Regional Water Board Executive Officer or their delegate may require the discharger to obtain regulatory coverage under this General Permit or an NPDES permit issued by the Regional Water Board.

III.E. Notice of Non-Applicability

- III.E.1. A discharger claiming “No Discharge” through a Notice of Non-applicability (NONA) as set forth in Water Code § 13399.30 shall meet the following eligibility requirement:
- a. The site’s physical location is not hydrologically connected to waters of the United States.
- III.E.2. When claiming the “No Discharge” option, the discharger shall submit and certify via SMARTS both the NONA and a No Discharge Technical Report. The No Discharge Technical Report shall identify the site by address or parcel number and demonstrate that the site meets the eligibility requirement described above in Section III.E.1.a.
- III.E.3. The No Discharge Technical Report shall be signed (wet signature and license number) by a California licensed professional engineer or geologist with hydrological expertise.
- III.E.4. The Regional Water Board may require the No Discharge Technical Report to be reassessed if it determines that there are errors in the No Discharge Technical Report or if the site is hydrologically connected to waters of the United States.

III.F. Revising Permit Coverage Information

The discharger shall revise permit coverage information, as appropriate, to:

- III.F.1. Update Construction Start and End Dates
- III.F.1.a. The discharger shall electronically certify and submit a revised Notice of Intent through a Change of Information in SMARTS, when the construction start or end date changes, recalculating sediment risk and revising the SWPPP as appropriate. The Change of Information shall be submitted at least 14 days prior to the date that was modified, unless infeasible due to unforeseen circumstances.
 - III.F.1.b. If the discharger is revising the construction start date to a later date than previously submitted, the Change of Information shall contain time-stamped photo documentation depicting that construction activities have not commenced for the entirety of the site.
- III.F.2. Reduce Acreage
- III.F.2.a. When a portion of the site meets conditions for termination of coverage (Section III.H) or is sold/transferred to a new owner, the discharger may reduce the disturbed acreage covered under the General Permit. The discharger reducing disturbed acreage shall electronically certify and submit the following Permit Registration Document revisions in SMARTS, through a Change of Information, within 30 days of the reduction in acreage:
 - i. A revised Notice of Intent indicating the new site size;

- ii. Photos demonstrating final stabilization, if applicable;
 - iii. Revised site map(s) showing (as applicable) acreage currently under construction; acreage sold/transferred, and/or added; and acreage currently stabilized in accordance with the Conditions for Termination of Coverage in Section III.H below; and
 - iv. A revised SWPPP to match the change in acreage.
- III.F.2.b. For a larger common plan of development for residential use, the discharger may, through the Change of Information process, remove residential lots from permit coverage once the lot meets the following criteria:
 - i. The residential lot has been sold to the individual homeowner(s) for residential use;
 - ii. A certificate of occupancy or equivalent document, is maintained on-site and can be made available during inspections;
 - iii. The lot is less than one acre of disturbance;
 - iv. All construction activity conducted on the lot by the discharger is complete; and
 - v. The discharger has temporarily stabilized any unfinished yard and landscaping areas with BMPs.
- III.F.2.c. The discharger shall upload, as an attachment in SMARTS, documentation of a contract (e.g., Covenants, Conditions, and Restrictions) requiring the individual homeowner to stabilize the yard and landscaping within one year and to maintain the temporary BMPs until the yard and landscaping are stabilized.
- III.F.2.d. The discharger shall maintain General Permit coverage for any site, parcel, or individual lot that has not received Change of Information or Notice of Termination approval from the Regional Water Board or obtained coverage under the new owner's Notice of Intent.
- III.F.3. Termination of Programmatic Permit Coverage for Linear Underground and Overhead Projects
 - III.F.3.a. Upon completion of construction activities for a specific site with linear underground and overhead project programmatic permit coverage, the discharger shall submit a Linear Construction Termination Notification for each completed linear segment.
 - III.F.3.b. The site must meet the termination conditions in Section III.H.3 below.
 - III.F.3.c. The Linear Construction Termination Notification must include photos demonstrating final stabilization.
 - III.F.3.d. Regional Water Board approval of the Linear Construction Termination Notification terminates coverage for the specific site.

III.F.4. Increase Acreage

III.F.4.a. If the disturbed acreage of the site will increase, the discharger shall certify and submit the following Permit Registration Documents revisions in SMARTS, through a Change of Information, prior to the increase in disturbed acreage:

- i. A revised Notice of Intent indicating the new site size;
- ii. A revised site map(s) showing (as applicable) acreage currently under construction; acreage sold, transferred, and/or added; and acreage currently stabilized in accordance with the conditions for terminating coverage in Section III.H below; and
- iii. A revised SWPPP to match current site size.

III.F.4.b. The discharger shall submit the applicable fees, in accordance with the revised fee notification, within 14 calendar days of the notification date. The Change of Information will be returned if these fees are not received by the State Water Board within 14 calendar days of the notification date.

III.F.4.c. Regulatory coverage under this General Permit for the added acreage is not approved until the Regional Water Board approves the Change of Information.

III.F.4.d. If the increased acreage is greater than one-fourth mile from the existing site boundary and is an acre or larger, the discharger is required to submit a separate Notice of Intent.

III.F.5. Change in Ownership

III.F.5.a. Prior to a sale/transfer of a site, parcel, or individual lot (change of ownership), the existing discharger shall submit a Notice of Termination for change of ownership and a certification that the new owner has been notified of applicable requirements to obtain new General Permit for the qualifying activities. The existing discharger certification shall include the name, address, telephone number, and email address of the proposed new owner in the Notice of Termination submitted through SMARTS.⁸

III.F.5.b. General Permit coverage is not transferable to a new owner. The new discharger will need to submit their own Permit Registration Documents to obtain a new WDID number prior to continuing construction activities and/or installing final landscaping (including meeting conditions for termination of coverage). The new discharger shall enter the original project start date (initial date of disturbance) from the previous discharger(s).

⁸ Dischargers that are submitting a Notice of Termination for a change of ownership, where the new owner will obtain permit coverage to complete construction, are not required to comply with the requirements in Order Section III.H.

III.G. Inactive Projects

- III.G.1. Dischargers with projects where all construction activities (including passive treatment, active treatment systems, and/or active equipment) will be suspended for 30 days or more may submit a Change of Information through SMARTS to revise the SWPPP. The Change of Information shall include:
 - a. Revised site map depicting the current status of construction; and
 - b. Photographs showing the temporary stabilization BMPs that were implemented.
- III.G.2. Upon Regional Water Board approval of the Change of Information, sampling may be suspended, and monitoring and inspections may be reduced as follows:
 - III.G.2.a. A QSD shall visit the inactive project within 14 days of Regional Water Board approval of the Change of Information to verify that the SWPPP is being implemented accordingly. If necessary, the QSD shall amend the SWPPP to address all new conditions not previously considered through a Change of Information in SMARTS.
 - III.G.2.b. A QSP or trained delegate shall visually inspect the inactive project at least once every calendar month and prior to any weather pattern that is forecasted to have a 50 percent or greater chance of 0.5 inches or more in a 24-hour period. Please refer to Attachments D and E Section III.C for information pertaining to visual inspection requirements.
 - i. The QSP or trained delegate shall verify BMPs are functioning in accordance with the SWPPP and implement corrective actions where necessary.
 - III.G.2.c. The above inspections are not required during dangerous weather conditions or when access to the site is infeasible (e.g., due to snow accumulation) or unsafe.
- III.G.3. Dischargers wishing to resume construction activities or the use of passive treatment, active treatment systems, and/or active equipment shall submit a Change of Information through SMARTS requesting to resume the project along with a revised site map based on current site conditions. Upon Regional Water Board approval of the Change of Information, the discharger is required to comply with all applicable requirements of this General Permit to resume construction activities at the site.

III.H. Terminating Permit Coverage

- III.H.1. To terminate General Permit coverage, the discharger shall electronically certify and submit the required documentation (Section III.H.2 below) to demonstrate compliance with all General Permit coverage termination requirements, including applicable post-construction BMPs and/or low impact development features.

- III.H.2. The discharger shall electronically certify and submit the following through SMARTS to be considered for General Permit coverage termination:
- a. A complete Notice of Termination;
 - b. QSP-prepared final Notice of Termination inspection with the QSP name and valid QSP certificate number;
 - c. A final site map; and
 - d. Photos demonstrating final stabilization and the implementation of applicable post-construction BMPs and/or low impact development.
- III.H.3. The discharger shall certify and submit a final site map, as part of the Notice of Termination documents through SMARTS. The Notice of Termination final site map shall, at minimum, include the following:
- a. Project boundaries and adjacent lands with labeled key features, such as roadways and waterbodies;
 - b. Developed drainage basin boundaries and discharge location points;
 - c. Site entrances and exits, lot boundaries, roads, structures, and features related to the project that may be used as a reference;
 - d. Specific permanent erosion control BMPs, post-construction BMPs, and low impact development features;
 - e. Individual erosion control BMPs (including final landscaping) identified using hatch patterns, symbols, or shading unique to each BMP;
 - f. Location and orientation of all photos used to document final site conditions and demonstrate compliance with post-construction requirements of this General Permit; and
 - g. If applicable, areas of the site being transferred to new ownership, and the name and contact information of the owner.
- III.H.4. The Regional Water Board will consider a site, parcel, or individual lot complete only when all portions of the site comply with all the following conditions:
- a. The discharger has completed all construction activity;
 - b. There is no greater potential for construction-related stormwater pollutants to be discharged into site runoff than prior to the construction activity;
 - c. Construction-related equipment and temporary BMPs have been removed from the site, except as set forth in Section III.F.2.b above;
 - d. Construction materials and wastes have been disposed of properly;
 - e. Soils disturbed by construction activities have been permanently stabilized (final stabilization), except as set forth in Section III.F.2.b above, using materials that:

- i. Have a product life that support the full and continued stabilization of the site;
 - ii. Achieve stabilization without becoming trash or debris; and
 - iii. Minimize the risk of wildlife entrapment;
- f. The discharger has ensured the QSP completed on-site visual inspections and verified the site complies with all Notice of Termination requirements, including installation of post-construction stormwater runoff BMPs and/or low impact development features;
- g. The Legally Responsible Person has submitted the information in the Notice of Termination and has certified and submitted through SMARTS; and
- h. The discharger has demonstrated that the site complies with all Notice of Termination conditions above (Section III.H) and all final stabilization conditions by one of the following methods:
- i. **70 percent final cover method.** No computational proof required. Requires permanent vegetative cover to be evenly established over 70 percent of all disturbed and exposed areas of soil (non-paved or non-built). In areas that naturally have low vegetative coverage (e.g., deserts), 70 percent of natural conditions of local undisturbed areas is acceptable. Photos of all site areas are required to verify compliance with the 70 percent final cover requirement;
OR
 - ii. **Revised Universal Soil Loss Equation (RUSLE or RUSLE2) method.** Computational proof required. Site conditions shall match values used in method computation. Photos of all site areas are required to verify pre-construction and post-construction conditions used in the computations;
OR
 - iii. **Custom method.** The discharger may request approval from the Regional Water Board to use a method or analytical model other than Section III.H.4.h.i and 4.h.ii above to demonstrate that the site complies with the “final stabilization” requirements. Photos of all site areas are required to verify the custom method used.

III.H.5. The Notice of Termination photo documentation for General Permit compliance verification shall include photos of the site’s final site conditions; post-construction BMPs and/or low impact development features; a description of the corresponding location, and orientation of photos as indicated on the final site map.

- III.H.6. The Notice of Termination shall include a long-term maintenance plan⁹ for the post-construction stormwater runoff BMPs and/or low impact development features being implemented.
- III.H.7. The Notice of Termination will be automatically approved 30 calendar days after the date of Notice of Termination is submitted, unless, within the 30 calendar days the Regional Water Board notifies the discharger through SMARTS that the Notice of Termination has been denied, returned, or accepted for review.
- III.H.8. All General Permit requirements remain in effect until the Notice of Termination is approved. The Legally Responsible Person will be notified through SMARTS communication when the discharger's General Permit coverage and corresponding WDID number are terminated.

IV. PERMIT REQUIREMENTS

IV.A. Authorized Non-Stormwater Discharges

- IV.A.1. Non-stormwater discharges from the following de-chlorinated potable and non-potable water sources are authorized if they comply with the requirements in Section IV.A.2 of this General Permit:
 - a. Fire-fighting activity;
 - b. Fire hydrant system flushing;
 - c. Irrigation of vegetative erosion control measures;
 - d. De-chlorinated potable water, including uncontaminated water line flushing;
 - e. Hydrostatic pipe flushing and testing water;
 - f. Air conditioning or compressor condensate;
 - g. Uncontaminated groundwater or spring water from construction dewatering activities in compliance with Attachment J; and
 - h. Water to control dust.
- IV.A.2. The above non-stormwater discharges are authorized under the following conditions:
 - a. The discharge is not routed through site areas with exposed soil, except for water used for dust control or to vegetation irrigation to stabilize areas;
 - b. The discharge does not cause or contribute to an exceedance of water quality standards in the receiving water;

⁹ For the purposes of this requirement, a long-term maintenance plan shall be designed for a minimum of five years, and describe the responsible party(ies), schedule, and procedures needed to ensure that post-construction features are adequately maintained and functional.

- c. The discharge complies with other applicable requirements of this General Permit including applicable action levels, effluent limitations, and monitoring and reporting requirements;
- d. The discharge is not prohibited by an applicable regional or statewide water quality control plan;
- e. The discharge is in accordance with other applicable State and Regional Water Board permits; and
- f. The discharge does not contain toxic constituents in toxic amounts and does not cause toxicity in the receiving water body.

IV.B. Discharge Prohibitions

- IV.B.1. Dischargers shall not violate any discharge prohibitions contained in applicable water quality control plans.
- IV.B.2. Discharges to Areas of Special Biological Significance (ASBS) are prohibited by the California Ocean Plan, unless granted an exception issued by the State Water Board.
- IV.B.3. All discharges are prohibited except for the stormwater and non-stormwater discharges specifically authorized by this General Permit or another NPDES permit. The discharger shall notify the Regional Water Board of existing or anticipated non-stormwater discharges not authorized by this General Permit, within 24 hours of the discharge, to determine if regulatory coverage is necessary through a separate NPDES permit.
- IV.B.4. All of the following discharges are prohibited:
 - a. Debris and trash, in accordance with State Water Board Resolution 2015-0019, the Trash Provisions of the Water Quality Control Plan for Ocean Waters of California and the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California, as applicable to construction stormwater discharges.
 - i. To comply with the Trash Provisions, dischargers shall implement, operate, and maintain trash management, treatment, and institutional controls to eliminate debris and trash from all stormwater discharges and authorized non-stormwater dischargers consistent with the prohibition of the discharge of debris and trash regulated by this General Permit. If the discharger is unable to comply with the prohibition of the discharge of debris and trash, the discharger must submit, for Regional Water Board Executive Office or designee approval, an amended Stormwater Pollution Prevention Plan addressing:
 - 1. A demonstration that the discharger is unable to comply with this outright prohibition of the discharge of debris and trash; and

2. A demonstration that the discharger's chosen combination of trash management, treatment, and institutional controls achieves full capture system equivalency.
- b. Treatment chemicals except as authorized in Attachment F and G;
- c. Wastewater from washout or cleanout of areas, structures or equipment with concrete, grout, stucco, paint or other construction materials;
- d. Form-release oils and curing compounds;
- e. Fuels, oils, fluids, or other materials used in vehicle and equipment operation and maintenance;
- f. Soaps, solvents, or detergents (e.g., used in vehicle equipment washing or external building wash down); and
- g. Toxic or hazardous substances (e.g., asbestos, lead, mercury, or PCBs).

IV.C. Effluent Limitations and Action Levels

IV.C.1. Narrative Effluent Limitations

- IV.C.1.a. Stormwater discharges and authorized non-stormwater discharges regulated by this General Permit shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 Code of Federal Regulations §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.
- IV.C.1.b. Dischargers shall minimize or prevent pollutants in stormwater discharges and authorized non-stormwater discharges through the use of controls, structures, and management practices set forth in the order and attachments of this General Permit that achieve best available technology (BAT) for toxic and non-conventional pollutants and best conventional technology (BCT) for conventional pollutants.

IV.C.2. Numeric Effluent Limitations¹⁰

- IV.C.2.a. All dischargers implementing active treatment systems are subject to the numeric effluent limitations required in Attachment F.
- IV.C.2.b. All dischargers that are Responsible Dischargers for a TMDL with a waste load allocation that was translated into a TMDL-related numeric effluent limitation, are subject to the numeric effluent limitations as indicated by Table H-2 in Attachment H.

¹⁰ Refer to Attachment B of this General Permit for the definitions of numeric effluent limitations and numeric effluent limitation exceedances.

IV.C.3. Numeric Action Levels¹¹

- IV.C.3.a. All dischargers that are Responsible Dischargers for a TMDL with a waste load allocation that was translated into a TMDL-related numeric action level, are subject to the numeric action level as indicated by Table H-2 in Attachment H.
- IV.C.3.b. Dischargers with dewatering activities not subject to a separate NPDES permit are subject to the numeric action levels required in Attachment J.
- IV.C.3.c. For Risk Level 2 and 3 sites, refer to Attachment D, Section III.G. For Type 2 and 3 linear underground and overhead projects, refer to Attachment E, Section III.G. For stormwater and authorized non-stormwater discharges, the numeric action level for pH is provided as a range where the lower value is 6.5 pH standard units and the upper value is 8.5 pH standard units. The discharger shall report the field reading to two decimal places. A numeric action level exceedance for pH occurs when the reading, obtained per each discharge location per day of each qualifying precipitation event, is below the lower value or above the upper value, as shown in Table 1 of this Section.
- IV.C.3.d. Risk Level 2 and 3 sites, refer to Attachment D, Section III.G. For Type 2 and 3 linear underground and overhead projects, refer to Attachment E, Section III.G. For stormwater and authorized non-stormwater discharges the numeric action level for turbidity is 250 Nephelometric Turbidity Units (NTU). An exceedance of the turbidity numeric action level occurs when the field reading, obtained per each discharge location per day of each qualifying event, is over 250 NTU, as shown in Table 1 of this Section.

¹¹ Refer to Attachment B of this General permit for the definitions of numeric action levels and numeric action level exceedances.

Table 1. Numeric Action Levels, Test Methods, Detection Limits, and Reporting Units

Parameter	Test Method	Discharger Type	Method Detection Limit	Units	Numeric Action Level
TMDL-Related Pollutant	U.S. EPA-approved test method for specific pollutant parameter	Responsible Dischargers	Depends on the test method	mg/L	Refer to Table H-2 in Attachment H
pH	Field test with calibrated portable instrument using EPA approved procedures	Risk Level 2 and 3 Risk Type 2 and 3	0.2	pH Units	Lower Value= 6.5 Upper Value= 8.5
Turbidity	EPA 0180.1 and/or field test with calibrated portable instrument	Risk Level 2 and 3 Risk Type 2 and 3	1	NTU	250

IV.D. Receiving Water Limitations

- IV.D.1. The discharger shall ensure that stormwater discharges and authorized non-stormwater discharges to any surface or ground water will not adversely affect human health or the environment.
- IV.D.2. The discharger shall ensure that stormwater discharges and authorized non-stormwater discharges will not contain pollutants in quantities that threaten to cause pollution or a public nuisance.
- IV.D.3. The discharger shall ensure that stormwater discharges and authorized non-stormwater discharges will not contain pollutants that cause or contribute to an exceedance of any applicable water quality objectives or water quality standards contained in an applicable water quality control plan.
- IV.D.4. Responsible Dischargers shall comply with the applicable TMDL implementation requirements in Attachment H of this General Permit, including TMDL-specific additional BMPs and site pollutant modeling, numeric action levels, and/or numeric effluent limitations.

IV.E. Linear Underground and Overhead Project Requirements

Dischargers with linear underground and/or overhead projects shall comply with the requirements included in Attachments E, E.1, and E.2 of this General Permit.

IV.F. Risk Level 1 Requirements

Risk Level 1 dischargers shall comply with the requirements included in Attachment D, D.1, and D.2 of this General Permit.

IV.G. Risk Level 2 Requirements

Risk Level 2 dischargers shall comply with the requirements included in Attachment D, D.1, and D.2 of this General Permit.

IV.H. Risk Level 3 Requirements

Risk Level 3 dischargers shall comply with the requirements included in Attachment D, D.1, and D.2 of this General Permit.

IV.I. Active Treatment System Requirements

Dischargers implementing an active treatment system shall comply with all of the requirements in Attachment F of this General Permit.

IV.J. Passive Treatment Requirements

Dischargers implementing passive treatment on-site shall comply with all the requirements in Attachment G of this General Permit.

IV.K. Total Maximum Daily Load Implementation Requirements

IV.K.1. Responsible Dischargers are dischargers who:

- a. Discharge stormwater and authorized non-stormwater directly, or through a municipal separate sewer system or other conveyance, to impaired water bodies or watersheds identified in a U.S. EPA approved total maximum daily load (TMDL) with a waste load allocation assigned to construction stormwater sources; and
- b. Have one or more TMDL-specific pollutant sources present on-site with the potential to enter construction stormwater discharge, which are required to be identified in the pollutant source assessment (refer to Section IV.O.2.i below).

IV.K.2. Responsible Dischargers shall comply with the applicable requirements in Attachment H of this General Permit.

IV.L. Discharges Subject to the California Ocean Plan

IV.L.1. Discharges to Ocean Waters

- IV.L.1.a. Dischargers that discharge directly into ocean waters that are subject to the model monitoring provisions of the California Ocean Plan shall be deemed in compliance with applicable California Ocean Plan model monitoring provisions when in compliance with monitoring requirements of this General Permit.
- IV.L.1.b. The Regional Water Boards may require a discharger that discharges directly into ocean waters who has demonstrated non-compliance with this General Permit's monitoring requirements to develop and implement a monitoring plan in compliance with additional effluent and ocean monitoring provisions established pursuant to Water Code § 13383.

IV.L.2. Discharges Granted an Exception for Areas of Special Biological Significance (ASBS)

- IV.L.2.a. Dischargers who were granted an exception to the California Ocean Plan prohibition of discharges of waste directly to an ASBS pursuant to Resolution 2012-0012 amended by Resolution 2012-0031 shall comply with the conditions and requirements set forth in Attachment I of this General Permit. Any discharger that applies for and is granted an exception to the California Ocean Plan prohibition after September 1, 2013, shall comply with the conditions and requirements set forth in the granted exception.

IV.M. Dewatering Requirements

- IV.M.1. Dischargers with dewatering activities subject to a separate NPDES permit (e.g., de minimis and low threat discharges) are not subject to comply with the dewatering requirements of this General Permit as found in Attachment J and shall obtain coverage as required by the State or Regional Water Boards.
- IV.M.2. Dischargers with dewatering activities not subject to a separate NPDES permit (e.g., de minimis and low threat discharges) shall comply with the dewatering requirements in Attachment J.

IV.N. Post-Construction Requirements

- IV.N.1. All dischargers, other than linear underground and overhead project dischargers, shall implement BMPs to reduce runoff and pollutants in stormwater discharges that are reasonably foreseeable after all construction phases have been completed at the site (post-construction BMPs).

- IV.N.2. Dischargers subject to the post-construction requirements of an existing NPDES Phase I or Phase II municipal separate storm sewer system permit are not subject to the post-construction requirements in Section IV.N.3 below, and shall submit the following items with their Permit Registration Documents through SMARTS:
- a. An attachment or web-source containing the applicable NPDES Phase I or Phase II municipal separate storm sewer system permittee's post-construction requirements; and
 - b. The post-construction plans and calculations submitted to, or approved by, the applicable NPDES Phase I or Phase II municipal separate storm sewer system permittee. If the discharger submitted preliminary post-construction plans and calculations as a Permit Registration Document, the discharger shall submit the approved plans and calculations within 14 days of approval by the municipal stormwater permittee, through a Change of Information in SMARTS. The discharger shall submit a Change of Information in SMARTS for any revisions to post-construction plans and calculations prior to submitting the Notice of Termination.
- IV.N.3. All dischargers, other than linear underground and overhead project dischargers or dischargers subject to the post-construction requirements of an existing NPDES Phase I or Phase II municipal separate storm sewer system permit, shall comply with the following post-construction runoff reduction requirements. The discharger shall comply with this General Permit's post-construction requirements if the Permit Registration Documents were submitted prior to the effective date of applicable post-construction requirements of the corresponding NPDES Phase I or Phase II municipal stormwater permit.
- IV.N.4. The discharger shall use non-structural and/or structural measures to replicate the pre-construction water balance (for this General Permit, defined as the volume of rainfall that ends up as runoff) for the smallest storms up to and including the 85th percentile, 24-hour precipitation event (or the smallest precipitation event that generates runoff, whichever is larger).
- IV.N.5. For sites with disturbed area exceeding two acres, the discharger shall preserve the pre-construction drainage density (miles of stream length per square mile of drainage area) for all drainage areas within the area serving a first order stream¹² or larger stream and ensure that post-project runoff time of concentration is equal to or greater than pre-project time of concentration.
- IV.N.6. The discharger shall certify and submit post-construction plans, calculations, and other supporting documentation as a Permit Registration Document in SMARTS. The discharger shall submit a Change of Information in SMARTS for

¹² A first order stream is defined as a stream with no tributaries.

any revisions to post-construction plans and calculations prior to submitting the Notice of Termination.

- IV.N.7. Regional Water Board staff may review post-construction plans, calculations, and other supporting documentation to verify that the post-construction water balance is accurate; and may request that the discharger make revisions if necessary.
- IV.N.8. The discharger may use the contact information found online or in Attachment C to request Regional Water Board staff review post-construction plans, calculations, and other supporting documentation prior to and during construction.

IV.O. Stormwater Pollution Prevention Plan Requirements

- IV.O.1. The discharger shall ensure the site's SWPPP complies with the below conditions:
 - a. A site-specific SWPPP is developed, and amended as necessary, by a QSD. The discharger is responsible for keeping the SWPPP and associated documents updated in SMARTS to reflect current site conditions and construction activities.
 - b. Trained personnel and BMP materials are available at the site as required by this General Permit.
 - c. The SWPPP includes the implementation of BMPs that comply with BAT, BCT, and ensure compliance with water quality standards; additional BMPs based on input from the QSP to address numeric action level and numeric effluent limitation exceedances; and additional training needed for the QSP, Legally Responsible Person, or designated persons on-site.
 - d. The SWPPP is available at the site and made available upon request by a federal, State, or municipal inspector. A current copy of the site-specific SWPPP and any site inspection reports required by this General Permit may be kept in electronic format at the site so long as the information requested by a federal, State, or municipal inspector can be made available during an inspection. All maps are legible and available in hard copy at the site.
- IV.O.2. The SWPPP shall include:
 - a. Identification of all pollutants, their sources, and control mechanisms, including sources of sediment associated with all construction activities (e.g., sediment, paint, cement, stucco, cleaners, site erosion);

- b. Pollutant source assessments, including a list of potential pollutant sources and identification of site areas where additional BMPs are necessary to reduce or prevent pollutants in stormwater and authorized non-stormwater discharges, per the following minimum requirements when developing the pollutant source assessment:
 - i. Consider all potential sources of pollutants, including non-visible pollutants which are known, or should be known to occur on-site including those that:
 - 1. Are used in construction activities;
 - 2. Are stored on-site;
 - 3. Were spilled or released during construction activities or past land use activities and not cleaned up; and
 - 4. Were applied to land as part of past land use activities.
 - ii. Consider all potential sources of pollutants associated with applicable TMDLs listed in Attachment H, and state whether or not sources of those pollutants are present on-site;
 - iii. Consider the quantity, physical characteristics (e.g., liquid, powder, solid), and locations of each potential pollutant exposed, source handled, produced, stored, recycled, or disposed of on-site;
 - iv. Consider the degree to which pollutants associated with those materials may be exposed to and mobilized by contact with stormwater; and
 - v. Consider the direct and indirect pathways that pollutants may be exposed to stormwater or authorized non-stormwater discharges. This shall include an assessment of past spills or leaks, non-stormwater discharges, and discharges from adjoining areas.
- c. Description of site-specific BMPs implemented to reduce or eliminate stormwater pollution, including the following, if applicable:
 - i. Minimum sediment and erosion control BMPs as outlined in Attachments D and E of this General Permit;
 - ii. Active treatment systems as included in an Active Treatment System Plan (as required in Section E.1 of Attachment F);
 - iii. Passive treatment technologies as included in a Passive Treatment Plan (as required in Section D.2 of Attachment G);
 - iv. BMPs implemented to address applicable TMDL implementation requirements (as required by Attachment H); and
 - v. Dewatering systems (as required by Attachment J).

- d. Site-specific BMPs initialized immediately to temporarily stabilize an area disturbed by construction where construction activities will not be resumed within 14 days;
- e. Identification, elimination, control, or treatment information for all non-stormwater discharges from the site not regulated by this or another NPDES permit;
- f. Description of efforts and BMPs used to minimize and control pollutants discharged from equipment and vehicle washing, wheel wash water, and other wash waters. Wash waters must be captured and properly disposed of and/or treated to mitigate impacts to water quality;
- g. Description of efforts and BMPs used to minimize exposure of building materials, building products, construction wastes, trash, landscape materials, fertilizers, pesticides, herbicides, detergents, sanitary waste, and other materials present on the site to precipitation and to stormwater;
- h. Description of spill and leak prevention and response plan including:
 - i. Procedures that effectively address hazardous and non-hazardous spills in accordance with law;
 - ii. Spill and leak response equipment and materials to be available on-site, cleaned up immediately, and disposed of properly; and
 - iii. Personnel are assigned and trained for spill and leak prevention and response.
- i. Construction Site Monitoring Program that describes methods and procedures for monitoring discharges in accordance with the applicable Attachment D or E that includes the following:
 - i. Visual inspection locations, inspection procedures, and follow-up tracking procedures.
 - ii. Applicable sampling locations, collection, and handling procedures shall include detailed procedures for field analysis, sample collection, storage, preservation, and shipping to the laboratory to ensure consistent quality assurance and control is maintained.
 - iii. A copy of the Chain of Custody form used when handling and shipping samples.
 - iv. Identification of the analytical methods and related method detection limits (if applicable) for each parameter.
 - v. Watershed Monitoring Option:
 - 1. If the discharger is part of a qualified regional watershed-based monitoring program approved by the Regional Water Board Executive Officer or their delegate, the discharger may be eligible for relief from the monitoring requirements in the applicable

Attachment D or E. The Regional Water Board may approve proposals to substitute a qualified watershed-based monitoring program if it determines the program will provide information to determine each discharger's compliance with the requirements of this General Permit.

- j. Title Sheet(s) with:
 - i. Project name;
 - ii. Project location (vicinity map);
 - iii. Preliminary schedule of activities;
 - iv. Site operating hours (hours when construction activities are occurring);
 - v. Index of attachments;
 - vi. Contact information for QSD(s), QSP(s), and trained delegates (name, phone numbers, license or certification number); and
 - vii. Signature of the QSD(s) who prepared the SWPPP.
- k. Pre-Earthwork Drawing with:
 - i. Site and project boundaries;
 - ii. Areas disturbed during geotechnical or other preconstruction investigation work;
 - iii. Existing roads and trails;
 - iv. Drainage areas;
 - v. Discharge locations;
 - vi. Existing storm drain system if applicable; and
 - vii. Proposed locations of storage areas for waste, construction materials, project staging areas, stockpiles, vehicles, equipment and vehicle maintenance, loading/unloading of materials, site access (entrance/exits), fueling, water storage, water transfer for dust control, demolition, and areas of other construction support activities.
- l. Construction and Earthwork Drawing(s) with:
 - i. Site layout (grading plans) including roads;
 - ii. Site and project boundaries;
 - iii. Drainage areas;
 - iv. Discharge locations;
 - v. Sampling locations;
 - vi. Areas of soil disturbance (temporary or permanent);
 - vii. Proposed active areas of soil disturbance (cut or fill);

- vii. Proposed locations of erosion control BMPs;
- ix. Proposed locations of sediment control BMPs;
- x. Proposed locations of run-off BMPs;
- xi. Temporary and/or permanent run-on conveyance (if applicable);
- xii. Proposed locations of active treatment systems(s) (if applicable);
- xiii. Locations of storage areas for waste, construction materials, project staging areas, stockpiles, vehicles, equipment and vehicle maintenance, loading/unloading of materials, site access (entrance/exits), fueling, water storage, water transfer for dust control, demolition, and areas of other construction support activities; and
- xiv. Site-specific procedures to implement final stabilization BMPs as soon as reasonably practicable.

IV.P. Annual Reporting Requirements

- IV.P.1. The discharger shall electronically certify and submit an Annual Report through SMARTS by September 1st for the previous reporting period from July 1st through June 30th if a WDID number is active for at least 90 days within the reporting period.
- IV.P.2. The discharger shall retain an electronic copy or hard copy of each Annual Report for a minimum of three years after the date the Annual Report is certified.
- IV.P.3. The Annual Report shall consist of the following:
 - a. The summary of all stormwater sampling and monitoring reports and supporting documents (e.g., laboratory reports);
 - b. The summary of all corrective actions taken during the compliance year;
 - c. The identification and explanation of any compliance activities (e.g., missed sampling or visual inspections) or corrective actions that were not implemented;
 - d. The summary of all the General Permit violations;
 - e. The names of individual(s) who performed the site inspections, sampling, visual inspections, and/or measurements;
 - f. The date, place, time of site inspections, sampling, visual inspections, and/or measurements, including the amount of precipitation measured in inches; and
 - g. All visual inspection and sample collection exception records and reports.

V. SITE ROLES AND PERSONNEL

V.A. Discharger Responsibilities

- V.A.1. The discharger, as defined in Attachment B, is responsible for all site activity affiliated with General Permit compliance and non-compliance including work done by QSDs, QSPs, and QSP delegates.
- V.A.2. The discharger shall ensure that the SWPPP and any required amendments are developed by a QSD. SWPPP changes or amendments shall be uploaded through SMARTS within 30 calendar days.
- V.A.3. The discharger shall ensure that all persons responsible for implementing this General Permit's requirements for a project shall be appropriately licensed or certified in accordance with this General Permit. For example, the discharger shall verify personnel serving as QSD(s) or QSP(s) have an active and current certificate, and engineering and/or geology work performed for the site is conducted by a California licensed professional.
- V.A.4. The discharger shall ensure that the correct construction start and end date are:
 - a. Used for each regulated construction project's risk determination;
 - b. Listed in SMARTS; and
 - c. Included on the unique WDID number notification form in a site location viewable by the public or readily available upon request if unable to post publicly.
- V.A.5. The discharger shall ensure project data and contact information is current in SMARTS.
- V.A.6. If a Legally Responsible Person changes, the discharger shall update the contact information for the Legally Responsible Person in SMARTS.

V.B. Legally Responsible Person

- V.B.1. When the discharger is required to sign, certify, and electronically submit any documents required by the General Permit, the State or Regional Water Board, or U.S. EPA, the signatory for the discharger is the Legally Responsible Person and must meet the definition of "Legally Responsible Person" set forth in Attachment B.
- V.B.2. The Legally Responsible Person may designate a Duly Authorized Representative, as defined in Attachment B, who may sign, certify, and electronically submit any documents, reports, or information required by this General Permit, the State or Regional Water Boards, or U.S. EPA. The Legally Responsible Person shall update the designation in SMARTS if there are any changes to the Duly Authorized Representative.
- V.B.3. The Legally Responsible Person and, if applicable, Duly Authorized Representative shall comply with the electronic signature and certification

requirements set forth in Section VI.H when submitting information required by the General Permit.

V.C. Discharger's Responsibilities for Qualified SWPPP Developer Performance

- V.C.1. The discharger shall retain a QSD from the beginning of the project through the Notice of Termination approval.
- V.C.2. A QSD is required to assess how construction activities will affect sediment transport, erosion, and other discharges of pollutants in stormwater runoff in the SWPPP design and implementation. The QSD is required to revise the SWPPP to address potential problems identified by visual inspections, sampling data, comments from a QSP, or their own site observations.
- V.C.3. A QSD is required to include in the SWPPP the name, email, and phone number of all the QSP-trained delegate(s).
- V.C.4. The discharger shall ensure that a QSD performs the following on-site visual inspections¹³:
 - a. Within 30 days of construction activities commencing on a site;
 - b. Within 30 days of a discharger replacing the QSD;
 - c. Twice annually, once August through October and once January through March;
 - d. Within 14 calendar days after a numeric action level exceedance; and
 - e. Within the time period requested in writing from Water Board staff.
- V.C.5. A QSD may perform the work of a QSP.

V.D. Discharger's Responsibilities for Qualified SWPPP Practitioner Performance

- V.D.1. The discharger shall ensure that a QSP reviews work performed by trained delegates including visual inspections, sampling, BMP implementation activities, and other required tasks listed in the SWPPP.
- V.D.2. The discharger shall ensure that a QSP performs the following on-site visual inspections¹⁴:
 - a. Once every calendar month;

13 These on-site visual inspection requirements are the minimum required and may be increased by the discharger or a QSD during times of high-risk construction activities, excessive site problems, or other conditions that warrant increased oversight by a QSD.

14 These on-site visual inspection requirements are the minimum requirements and may be increased by the discharger or a QSD during times of high-risk construction

- b. Within 72 hours prior to a forecasted Qualifying Precipitation Event to inspect areas of concern to verify the status of any deficiencies, BMPs, or other identified issues at the site. If extended forecast precipitation data (greater than 72 hours) is available from the National Weather Service, the pre-precipitation event inspection may be done up to 120 hours in advance;
- c. Within 14 days after a numeric action level exceedance the QSP shall visually inspect the drainage area of exceedance and document any areas of concern; and
- d. Prior to the submittal of General Permit Notice of Termination or Change of Information (for acreage changes) of all or part of a site.

V.D.3. The discharger shall ensure that a QSP verifies the following:

- a. All BMPs required in the SWPPP are implemented, correctly installed, inspected, and maintained;
- b. Track out of construction related material at site entrances and exits is controlled;
- c. The SMARTS generated WDID number notification form is in a site location viewable by the public or readily available upon request, kept up to date, and the start and end dates are correct and match the dates listed in SMARTS for the project;
- d. Sampling protocols for stormwater and non-stormwater discharges are correctly performed as described in the SWPPP by on-site trained personnel delegated by a QSP (including, but not limited to, taking representative samples of the runoff);
- e. Contact information including, name, phone number, and email address for the discharger, Legally Responsible Person, QSD(s), and QSP(s) is correct and updated in SMARTS within 90 days of a change); and
- f. Photo documentation of problem areas of erosion, new sediment deposition, unauthorized non-stormwater discharges, and/or failed BMPs is included in the SWPPP and are made available upon a regulatory inspector's request.

V.E. Discharger Responsibilities for Delegates' Performance

V.E.1. The discharger may authorize a QSP to delegate visual inspections, sampling, and/or SWPPP and BMP implementation activities to others (delegates) (e.g., superintendent, project manager, foreman, contractor, coworker) that have received training for their respective tasks. A QSP opting to delegate tasks to

activities, excessive site problems, or other conditions that warrant increased oversight of the site.

others shall provide the following training based on the guidelines set by the Construction General Permit Training Team:

- a. Foundational training for all delegates regarding stormwater compliance roles and responsibilities, forecast information, and documentation and reporting procedures; and
- b. Site-specific training regarding visual inspections, sampling procedures, and/or SWPPP and BMP implementation activities relevant to the delegate's assigned responsibilities.

V.E.2. The discharger shall ensure the following for QSP-delegate(s):

- a. A QSP has determined the delegate(s) can perform and have a competent understanding of the visual inspection, sampling, and/or SWPPP and BMP implementation tasks prior to fully delegating the responsibility to the individual;
- b. The current delegate(s), including name, email, and phone number, are maintained in a training log, uploaded as an attachment to the SWPPP in SMARTS, prior to the delegate performing the delegated function; and
- c. The delegate(s) have a system used to record and report issues back to the QSP within 24 hours of when a corrective action is needed.

V.E.3. The delegate cannot perform the QSD and QSP inspections required in Section V.C.4 or Section V.D.2, respectively.

V.F. Becoming a Qualified SWPPP Developer (QSD) or Qualified SWPPP Practitioner (QSP)

V.F.1. All QSDs and QSPs shall have fundamental knowledge of erosion and sedimentation processes, best management practices, and their implementation to control pollutants in stormwater discharges.

V.F.2. California licensed professional engineers or geologists may self-certify their eligibility to serve as a QSD/QSP via the State Water Board Construction Stormwater Program website.

V.F.2.a. Consistent with Title 16, California Code of Regulations, § 475 Code of Professional Conduct, a California Board for Professional Engineers, Land Surveyors, and Geologists (CBPELSG) licensee shall provide service for a project in a manner that is consistent with the laws, codes, ordinances, and regulations applicable to that project. A CBPELSG licensee shall not misrepresent their scope of authority affiliated with their professional license.

V.F.2.b. The State Water Board expects that a CBPELSG licensee serving a discharger enrolled in this General Permit has thorough knowledge of the conditions and requirements of this General Permit and the required supporting documents and information.

- V.F.3. A person can obtain a QSD or QSP certification through the CASQA by completing the following steps:
- Step 1: Complete a required prerequisite to take the QSD or QSP training course;
 - Step 2: Complete the QSD or QSP training course;
 - Step 3: Pass the QSD or QSP exam; and
 - Step 4: Register as a QSD or QSP through the CASQA website.
- V.F.4. A QSD applicant shall currently possess at least one of the following prerequisites:
- a. A California landscape architect registration;
 - b. A professional hydrologist registration through the American Institute of Hydrology;
 - c. A Certified Professional in Erosion and Sediment Control (CPESC)TM registration through EnviroCert International, Inc.;
 - d. A Certified Professional in Stormwater Quality (CPSWQ)TM registration through EnviroCert International, Inc.; or
 - e. Any prerequisite course approved by the State Water Board's Division of Water Quality Deputy Director in accordance with Section V.G.
- V.F.5. A QSP applicant shall currently possess at least one of the following prerequisites:
- a. A Certified Erosion, Sediment, and Stormwater Inspector (CESSWI) registered through Enviro Cert International, Inc.;
 - b. A certified inspector of sediment and erosion control registered through Certified Inspector of Sediment and Erosion Control (CISEC) Inc.;
 - c. A Construction Management degree from an accredited 4-year institution that includes coursework that covers the underlying principles of erosion and sediment control and practices of reducing pollution in stormwater; or
 - d. Any prerequisite course approved by the State Water Board's Division of Water Quality Deputy Director in accordance with Section V.H.
- V.F.6. To remain in good standing with their certification, QSDs and QSPs registered through CASQA shall:
- a. Complete 6 hours, annually, of continuing education on site assessment techniques, best management practice design and implementation, inspection techniques, or monitoring approaches. This requirement can be fulfilled in whole or in part by continuing education taken to maintain any of the approved underlying prerequisites; and

- b. Complete the online QSD or QSP renewal process every two years, including a review of materials addressing permit implementation updates, clarifications, and experiences as provided by the Construction General Permit Training Team.

V.G. Pre-existing QSP and QSD qualification

- V.G.1. A QSD or QSP who maintained a valid certification as of the effective date of this General Permit shall remain in good standing.
 - V.G.1.a. Existing QSDs and QSPs certified through CASQA shall, prior to the expiration date of their current certificate, certify that they have maintained a valid underlying certification and complete the recertification review or refresher training through CASQA's renewal process.
 - V.G.1.b. Existing QSD/QSPs who have self-certified with the State Water Board that they are a California licensed professional engineer or California licensed professional geologist shall complete the recertification process through the State Water Board Construction Stormwater Program website and complete self-directed training required by the State Water Board before September 1, 2024.

V.H. QSP and QSD Prerequisite Course Qualification

- V.H.1. The State Water Board's Division of Water Quality Deputy Director may approve the qualification of additional prerequisite courses for QSD and QSP certification.
- V.H.2. Individuals may recommend additional prerequisite courses by emailing the [Stormwater Help Desk](mailto:stormwater@waterboards.ca.gov) (stormwater@waterboards.ca.gov). The course curriculum shall meet an acceptable level of training and require continuing education to maintain their certification.
- V.H.3. The Construction General Permit Training Team will review any recommended prerequisite courses and provide feedback for the State Water Board Division of Water Quality Deputy Director's consideration. If approved, the course will be listed on the [State Water Board's Construction Stormwater Program website](https://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.html) (https://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.html) as an approved prerequisite course.

V.I. Water Board Rescission of a QSP or QSD Certification

- V.I.1. The State Water Board Executive Director or a Regional Water Board Executive Officer may:
 - a. Suspend any QSD or QSP certification and require that additional training be completed as a condition of re-instatement if the Executive Director or Executive Officer finds, in writing, that the QSD or QSP in the course of acting as a QSD or QSP at one or more site(s) lacked adequate knowledge or training to perform duties required by the General Permit; and/or

- b. Rescind any QSD or QSP certification if, after providing notice and an opportunity to be heard, the Executive Director or Executive Officer finds, in writing, that the QSD or QSP has in the course of acting as a QSD or QSP at one or more site(s), (1) willfully or negligently caused or allowed a violation of this General Permit; (2) submitted false or misleading information to the State Water Board or any Regional Water Board, (3) used fraud or deception; or (4) failed to use reasonable care and good judgment.

- V.I.2. An individual whose QSD or QSP certification has been rescinded may request the State Water Board to review the rescission. Any request for review must be received by the State Water Board no later than 30 days after the date that the individual received written notice of the rescission.

VI. STANDARD PROVISIONS

VI.A. Duty to Comply

- VI.A.1. The discharger shall comply with all General Permit conditions and requirements. Any General Permit non-compliance constitutes a violation of the Clean Water Act and the Porter-Cologne Water Quality Control Act and is grounds for enforcement action and/or removal of General Permit coverage.
- VI.A.2. The discharger shall comply with effluent standards or prohibitions established under Clean Water Act § 307(a) for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions.

VI.B. Need to Halt or Reduce Activity Not a Defense

A discharger's claim that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with this General Permit shall not be a defense in an enforcement action.

VI.C. Duty to Mitigate

The discharger shall take all responsible steps to minimize or prevent any discharge that has a reasonable likelihood of adversely affecting human health or the environment in violation of this General Permit, which includes ceasing discharge as necessary.

VI.D. Proper Operation and Maintenance

- VI.D.1. The discharger shall at all times properly install, operate, and maintain any treatment and control facilities, systems, related appurtenances, and backup or auxiliary systems (treatment control systems) which are installed or used by the discharger to achieve compliance with this General Permit's conditions.
- VI.D.2. The discharger shall include adequate laboratory controls and appropriate quality assurance procedures for all treatment control systems.

VI.E. Property Rights

This General Permit does not: (1) convey any property rights of any sort or any exclusive privileges, (2) authorize any injury to private property or any invasion of personal rights, (3) or authorize any infringement of federal, state, or local laws or regulations.

VI.F. Duty to Maintain Records and Provide Information

- VI.F.1. The discharger shall maintain a paper or electronic copy of all required records and reports, including but not limited to, a copy of this General Permit and all its attachments and Fact Sheet, for three years from the date generated or date submitted whichever is later.
- VI.F.2. The discharger shall furnish the Water Boards or U.S. EPA, within a reasonable time, any requested information to determine compliance with this General Permit. The discharger shall also furnish, upon request, copies of records that are required to be kept by this General Permit.

VI.G. Inspection and Entry

- VI.G.1. The discharger shall allow staff of the Water Boards, U.S. EPA, and/or an authorized representative of the municipal separate storm sewer system receiving the discharge to:
 - a. Enter the site premises during a regulated construction activity and/or at the location where compliance records are maintained in accordance with this General Permit;
 - b. Access and copy any compliance records maintained in accordance with this General Permit;
 - c. Inspect the complete project and site, including any off-site staging areas or material storage areas, and the erosion/sediment controls;
 - d. Sample, monitor, or install automated sampling equipment to ensure General Permit monitoring compliance; and
 - e. Conduct bioassessment monitoring (if required by a Regional Board water quality control plan), receiving water monitoring, and/or evaluate the performance of BMPs.

VI.H. Electronic Signature and Certification Requirements

- VI.H.1. All documents submitted to the Water Boards (including, but not limited to, Permit Registration Documents, Annual Reports, monitoring records, and

Notices of Termination) are required to be certified by the Legally Responsible Person¹⁵ or a Duly Authorized Representative¹⁶ through SMARTS.

VI.H.2. All documents (e.g., designs, plans, reports) that require engineering or geologic evaluations and judgments must be prepared by, or under the direction of, appropriately licensed professionals in the State of California. The licensee must sign and provide their registration number or stamp on the documents to be submitted and certified by the Legally Responsible Person or Duly Authorized Representative.

VI.H.3. Any person signing documents under Section VI.H shall make the following certification:

“I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. I am also aware that my user ID and password constitute my electronic signature and any information I indicate I am electronically certifying contains my signature. I understand that my electronic signature is the legal equivalent of my handwritten signature. My signature on this form certifies that my electronic signature is for my own use, that I will keep it confidential, and that I will not delegate or share it with any other person. Should I wish to delegate such authority, I will do so formally in writing and electronically notify the State Water Board using SMARTS of such delegation within 10 days of the delegation. I further certify that I will protect my electronic signature from unauthorized use, and that I will contact the State Water Board, within two business days of discovery, if I suspect that my electronic signature has been lost, stolen, or otherwise compromised.”

VI.H.4. Clean Water Act § 309(c)(4) provides that any person who knowingly makes any false material statement, representation, or certification in any record or other document submitted or required to be maintained under this General Permit, including reports of compliance or non-compliance shall upon conviction, be penalized with a monetary fine of up to \$10,000 or by imprisonment for not more than two years, or both.

15 Defined in this General Permit, Attachment B (Glossary)

16 Defined in this General Permit, Attachment B (Glossary)

VI.I. Anticipated Noncompliance

The discharger shall provide advance notice, in writing, to the applicable Regional Water Board and local stormwater management agency of any planned changes in site construction activities that may result in non-compliance with this General Permit.

VI.J. Reporting of Contaminated Soils

The discharger shall have soils sampled and tested to ensure proper handling and public safety measures are implemented when soil contamination is found or suspected, and a responsible party is not identified, or the responsible party fails to promptly take the appropriate action. The discharger shall notify the appropriate local, state (including the Regional Water Board), and federal agency(ies) when contaminated soil is found at a site.

VI.K. Bypass

- VI.K.1. Bypass¹⁷ is prohibited unless the discharger demonstrates one or more of the following conditions:
- a. In accordance with the bypass requirements for active treatment systems in Attachment F; or
 - b. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage¹⁸; or
 - c. There were no feasible alternatives to bypass, such as the use of auxiliary treatment facilities, retention of untreated waste, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that could occur during normal periods of equipment downtime or preventative maintenance; or
 - d. The discharger allowed a bypass to occur that does not cause the exceedance of an effluent limitation(s), due to essential maintenance to assure efficient operation. In such a case, the above bypass conditions are not applicable; and

17 The intentional diversion of waste streams from any portion of a treatment facility or system.

18 Severe property damage means substantial physical damage to property, damage to the treatment facilities that causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

- e. The discharger submitted a notice to the Regional Water Board, at least 14 calendar days in advance of the need for a bypass except where advance notice was not possible due to an emergency situation where the bypass was unavoidable to prevent loss of life, personal injury or severe property damage. If the discharger was unable to notify the Regional Water Board in advance of a bypass the discharger shall submit written notification to the Regional Water Board within 14 days after the bypass occurs.

VI.L. Upset

- VI.L.1. To establish an affirmative defense of an upset,¹⁹ a discharger must demonstrate the following through properly signed, contemporaneous operating logs or other relevant evidence:
 - a. The non-compliance discharge location;
 - b. The cause(s) of the upset;
 - c. The treatment facility was properly operated and maintained at the time of the upset;
 - d. The discharger submitted notice of the upset as required; and
 - e. Any required remedial measures were implemented as soon as feasibly possible.
- VI.L.2. An administrative determination made before an action of noncompliance occurs is not a final administrative action subject to review.
- VI.L.3. In an enforcement proceeding, the discharger seeking to establish the occurrence of an upset has the burden of proof.

VI.M. Oil and Hazardous Substance Liability

This General Permit, or parts of this General Permit (including, but not limited to, the findings, requirements, conditions, and provisions) shall not be construed to preclude the institution of any legal action or relieve the discharger from any responsibilities, liabilities, or penalties to which the discharger is or may be subject to under Clean Water Act § 311.

19 An exceptional incident in which there is unintentional and temporary non-compliance with technology-based numeric effluent limitations because of factors beyond the reasonable control of the discharger. An upset event does not include a large precipitation event, wind event, or other natural weather-related force of nature. An upset does not include non-compliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation.

VI.N. Severability

The provisions of this General Permit are severable; if any provision of this General Permit or the application of any provision of this General Permit to any circumstance is held invalid, the application of such provision to other circumstances, and the remainder of this General Permit, shall not be affected thereby.

VI.O. Reopener Clause

- VI.O.1. This General Permit may be modified, revoked and reissued, or terminated for cause due to promulgation of amended regulations, receipt of U.S. EPA guidance concerning regulated activities, judicial decision, or in accordance with 40 Code of Federal Regulations §§ 122.62, 122.63, 122.64, and 124.5.
- VI.O.2. The submittal of a request by the discharger for a General Permit modification, revocation and reissuance, or termination, notification of planned changes, or anticipated non-compliance does not annul any General Permit condition.
- VI.O.3. This General Permit shall be modified or revoked and reissued to conform if any applicable toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) promulgated under Clean Water Act §307(a) for a toxic pollutant which is present in the discharge and the standard or prohibition is more stringent than any pollutant limitation in this General Permit. The Water Boards shall provide the public and dischargers notice of the action.
- VI.O.4. This General Permit may be reopened before March 23, 2032 to revise the requirements implementing the Los Angeles and Long Beach Harbor Waters TMDL for copper, lead, and zinc, for dischargers that discharge to the Dominguez Channel or the Torrance Lateral Channel. State Water Board staff will work with interested stakeholders to develop a plan to collect additional data related to the forthcoming implementation of the 100 mg/L TSS numeric effluent limitation, including the soil screening investigation, and report to the State Water Board via the Executive Director report no later than September 1, 2024. The State Water Board will evaluate whether the additional data and other available information warrants revising the requirements implementing the Los Angeles and Long Beach Harbor Waters TMDL for copper, lead, and zinc at a publicly noticed Board meeting no later than August 31, 2028.
- VI.O.5. This General Permit may be reopened to revise the requirements implementing the Los Angeles Lakes TMDL for chlordane, DDT, dieldrin, and PCBs that discharge to Peck Road Park Lake, Echo Park Lake or Puddingstone Reservoir. State Water Board staff will work with interested stakeholders to develop a plan to collect additional data related to the implementation of the 100 mg/L TSS numeric effluent limitation, including the soil screening investigation, and report to the State Water Board via the Executive Director report no later than September 1, 2023. Upon completion of the work required by the plan, the State Water Board will evaluate whether the additional data and other available

information warrants revising the requirements implementing the Los Angeles Lakes TMDL for chlordane, DDT, dieldrin, and PCBs at a publicly noticed Board meeting.

VI.P. Penalties for Violations of General Permit Conditions

- VI.P.1. Clean Water Act § 309 provides significant penalties for any person who violates a permit condition implementing Clean Water Action §§ 301, 302, 306, 307, 308, 318, or 405 or any permit condition or limitation implementing any such section in a permit issued under § 402. Any person who violates any permit condition of this General Permit is subject to a civil penalty not to exceed \$37,500²⁰ per calendar day of such violation, as well as any other appropriate sanction provided by §309 of the Clean Water Act.
- VI.P.2. Clean Water Act § 309(c)(4) provides that any person who knowingly makes any false material statement, representation, or certification in any record or other document submitted or required to be maintained by this General Permit, including reports of compliance or non-compliance shall upon conviction, be punished by a fine of not more than \$10,000 or by imprisonment for not more than two years or both.
- VI.P.3. The Porter-Cologne Water Quality Control Act provides specific administrative, civil, and criminal penalties, which in some cases are greater than those under the Clean Water Act.

VI.Q. Water Quality Based Corrective Actions²¹

- VI.Q.1. By the end of each reporting year, if the discharger's construction stormwater and/or non-stormwater discharges contain pollutants that are in violation of Receiving Water Limitations (Section IV.D) or in the event that a Responsible Discharger's discharge exceeds an applicable numeric effluent limitation in Attachment H, the discharger shall:
 - a. Conduct a site assessment to identify pollutant source(s) within the site that are associated with construction activity and whether the BMPs described in the SWPPP have been properly implemented;
 - b. Evaluate the site's SWPPP and its implementation to determine whether additional BMPs or SWPPP implementation measures are necessary to reduce or prevent pollutants in all regulated discharges to comply with the Receiving Water Limitations (Section IV.D) or applicable numeric effluent limitations in Attachment H; and

²⁰ May be further adjusted in accordance with the Federal Civil Penalties Inflation Adjustment Act.

²¹ Terms including, but not limited to, Responsible Dischargers, numeric effluent limitations and exceedances are defined in Attachment B of this General Permit.

c. Certify and submit, through SMARTS, documentation based upon the above site assessment and SWPPP evaluation that:

- i. Additional BMPs and/or SWPPP implementation measures have been identified and included in the SWPPP to comply with the Receiving Water Limitations (Section IV.D) or applicable numeric effluent limitations in Attachment H; or
- ii. No additional BMPs or SWPPP implementation measures are required to reduce or prevent pollutants in all regulated discharges to comply with the Receiving Water Limitations (Section IV.D) or applicable numeric effluent limitations in Attachment H.

VI.Q.2. The Regional Water Board or its delegate may require revisions of the discharger's water quality-based corrective actions and/or request additional supporting documentation.

VI.R. Continuation of Expired General Permit

This General Permit continues in force and effect until the effective date of a new General Permit adopted by the State Water Board or the State Water Board rescinds this General Permit.

VII. REGIONAL WATER BOARD AUTHORITIES

- VII.A.** Regional Water Boards (as defined in Attachment B) may terminate General Permit coverage upon determination that a discharger has failed to comply with General Permit requirements. The Regional Water Boards may also terminate General Permit coverage upon determination that the subject discharges must be regulated through a separate Regional Water Board-issued NPDES permit.
- VII.B.** Regional Water Boards may require a discharger to comply with additional monitoring and reporting requirements, including but not limited to, increasing sampling frequency, requiring analysis of additional parameters, increasing the frequency of inspections by the Qualified SWPPP Developer and Qualified SWPPP Practitioner, or implementation of recommendations by the Qualified SWPPP Developer and Qualified SWPPP Practitioner, pursuant to California Water Code § 13383.
- VII.C.** All Regional Water Board actions that modify requirements for compliance, pursuant to California Water Code §13383, with this General Permit shall be provided to the discharger in writing and submitted through SMARTS.
- VII.D.** Regional Water Boards may require dischargers to retain records required by this General Permit for more than the three years.
- VII.E.** Regional Water Boards may obtain site-specific data, records, or documentation demonstrating one or more numeric action level exceedances occurred at a site and may direct the discharger to revise their SWPPP and/or BMPs to address the exceedance.

- VII.F.** Consistent with California Water Code §§13350(a) and/or 13376, Regional Water Boards finding a discharger in violation of a prohibition or requirement in this General Permit with the potential to discharge pollutants into the waters of the United States, may require a discharger to revise and re-submit the SWPPP, other required documents and/or implement additional BMPs to address site-specific conditions.
- VII.G.** Consistent with 40 Code of Federal Regulations §§ 122.26(a)(9)(i)(D) and 122.26(a)(9)(i)(C), a Regional Water Board may require any discharge of stormwater and non-stormwater from construction activity that is not regulated by this General Permit, and that may cause or contribute to an exceedance of a water quality standard, to obtain General Permit coverage.
- VII.H.** A Regional Water Board has the authority to require a Risk Level determination to be reassessed for a site currently regulated under this General Permit, or with an active waiver, as deemed necessary, including but not limited to the following circumstances:
1. The discharger has a demonstrated history of General Permit non-compliance with this General Permit or its predecessors;
 2. The subject construction site poses a significant risk of causing or contributing to an exceedance of a water quality standard without the implementation of the additional Risk Level 2 or 3 requirements; or
 3. The Regional Water Board staff have documented that the discharger Risk Level for the subject site is calculated incorrectly.

ATTACHMENT A

ACRONYMS AND TERMS

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) GENERAL PERMIT FOR STORMWATER DISCHARGES ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES (GENERAL PERMIT)

Acronym or Term	Definition
ASBS	Areas of Special Biological Significance
ASTM	American Society of Testing and Materials; Standard Test Method for Particle-Size Analysis of Soils
ATS	Active Treatment System
BAT	Best Available Technology Economically Achievable
BCT	Best Conventional Pollutant Control Technology
BMP	Best Management Practice
BOD	Biochemical Oxygen Demand
CBPELSG	California Board of Professional Engineers, Land Surveyors and Geologists
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CGP	NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities
CIWQS	California Integrated Water Quality System
COI	Change of Information
CPESC	Certified Professional in Erosion and Sediment Control
CPSWQ	Certified Professional in Storm Water Quality
CSMP	Construction Site Monitoring Program
CTR	California Toxics Rule
CWA	Clean Water Act
CWC	California Water Code
DAR	Duly Authorized Representative
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
DWQ	Division of Water Quality
ELAP	Environmental Laboratory Accreditation Program
ELG	Effluent Limitation Guidelines
JTU	Jackson Turbidity Units
LID	Low Impact Development
LOEC	Lowest Observed Effect Concentration
LRP	Legally Responsible Person

LUP	Linear Underground and Overhead Projects
MATC	Maximum Allowable Threshold Concentration
MDL	Method Detection Limit
MRP	Monitoring and Reporting Program
MS4	Municipal Separate Storm Sewer System
NAL	Numeric Action Level
NEL	Numeric Effluent Limitation
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
NOEC	No Observed Effect Concentration
NOI	Notice of Intent
NONA	Notice of Non-Applicability
NOT	Notice of Termination
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NTR	National Toxics Rule
NTU	Nephelometric Turbidity Units
O&M	Operation and Maintenance
OC	Organochlorine
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
POTW	Publicly Owned Treatment Works
PRD	Permit Registration Document
Previous Permit	State Water Board Order 2009-009-DWQ, as amended by Orders 2010-0014-DWQ and 2012-0006-DWQ
QA/QC	Quality Assurance and Quality Control
QAPrP	Quality Assurance Program Plan
QSD	Qualified SWPPP Developer
QSP	Qualified SWPPP Practitioner
Regional Water Board	Regional Water Quality Control Board
RUSLE	Revised Universal Soil Loss Equation
RUSLE2	Revised Universal Soil Loss Equation 2
SMARTS	Stormwater Multiple Application and Report Tracking System
State Water Board	State Water Resources Control Board
SWAMP	Surface Water Ambient Monitoring Program
SWMM	Storm Water Management Model
SWPPP	Storm Water Pollution Prevention Plan
TDS	Total Dissolved Solids
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
USC	United States Code
U.S. EPA	United States Environmental Protection Agency
USGS	United States Geological Survey

Water Boards	Collectively, the State Water Resources Control Board and the Regional Water Quality Control Boards
WDID	Waste Discharge Identification Number
WLA	Waste Load Allocation
WER	Water Effect Ratio
WET	Whole Effluent Toxicity
WQO	Water Quality Objective
WQS	Water Quality Standard

ATTACHMENT B

GLOSSARY

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) GENERAL PERMIT FOR STORMWATER DISCHARGES ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES (GENERAL PERMIT)

70 Percent Final Cover

For final construction site stabilization, 70 percent final cover is the permanent vegetative cover that is evenly established over 70 percent of all disturbed and exposed areas of soil (non-paved or non-built). In areas that naturally have low vegetative coverage (e.g., deserts), 70 percent of natural conditions is acceptable.

Active Areas of Construction

Active areas of construction are all areas subject to land surface disturbance activities related to the project including, but not limited to, project staging areas, immediate access areas and storage areas. All previously active areas of construction are considered active areas (unless temporarily defined as inactive areas) until final stabilization is complete.

Active Treatment System

An active treatment system is a treatment technology that employs chemical coagulation, chemical flocculation, or electrocoagulation to reduce turbidity caused by fine suspended sediment, and/or to control pH levels. An active treatment system relies on enclosed computerized systems with pumps, filters, and real-time controls.

Acute Toxicity

Acute toxicity in water is caused by chemical stimuli that rapidly induce a negative effect on aquatic life; in aquatic toxicity tests, acute toxicity is demonstrated by an effect observed within 96 hours or less.

Aerial Deposition

Aerial deposition is the deposition of airborne particulates from construction activities or nearby activities that settle onto surfaces. Such particulates can include, but are not limited to, metals, nutrients, organics, sediment, and trash.

Ancillary Facility

An ancillary facility is a support area required for construction activities of the linear underground and overhead project permitted area. The ancillary facility may be located adjacent to or within the linear underground and overhead project alignment (i.e., transmission/distribution right-of-way) or may be regionally located away from the linear underground and overhead project alignment. Ancillary areas include, but are not limited to, new access roads, helicopter landing zones, laydown yards, staging areas, substations, valve stations, etc.

Best Available Technology Economically Achievable (BAT)

As defined by U.S. EPA, BAT is a technology-based standard established by the Clean Water Act (CWA) § 304(b)(2) as the most appropriate means available on a national basis for controlling the direct discharge of toxic and nonconventional pollutants to navigable waters. The BAT effluent limitations guidelines, in general, represent the best existing performance of treatment technologies that are economically achievable within an industrial point source category or subcategory.

Best Conventional Pollutant Control Technology (BCT)

As defined by U.S. EPA, BCT is a technology-based standard established by the Clean Water Act (CWA) § 304(b)(4) for the discharge from existing industrial point sources of conventional pollutants including biochemical oxygen demand (BOD), total suspended sediment (TSS), fecal coliform, pH, and oil and grease.¹

Best Management Practices (BMPs)

BMPs are management practices and structural controls used to prevent or reduce the discharge of pollutants from runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage to waters of the United States. BMPs include scheduling of activities, prohibitions of practices, operation and maintenance procedures, treatment, and vegetated infiltration basins amongst other practices.

Best Professional Judgment

Best professional judgement is a method used by permit writers to develop technology-based NPDES permit conditions on a case-by-case basis using all reasonably available and relevant data to establish technology-based limits or to determine other appropriate means to control its discharge (U.S. EPA NPDES Permit Writer's Manual 2010).

Chain of Custody Form

The Chain of Custody form is used to track sample handling as samples progress from sample collection to the analytical laboratory. The Chain of Custody form is then used to track the resulting analytical data from the laboratory to the client. Chain of Custody forms can be obtained from an analytical laboratory upon request.

Coagulation

Coagulation is the clumping of particles in a discharge to settle out impurities, often induced by chemicals such as lime, alum, and iron salts.

Common Plan of Development or Sale

A common plan of development or sale is a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under one common plan. The "common plan" of development or sale is broadly defined as any announcement or piece of documentation (including a sign, public notice or hearing, sales pitch, advertisement, drawing, permit application, zoning request, computer design, etc.) or physical demarcation (including boundary signs, lot

¹ U.S. EPA. [Learn about Effluent Guidelines](https://www.epa.gov/eg/learn-about-effluent-guidelines#BCT). Web. <<https://www.epa.gov/eg/learn-about-effluent-guidelines#BCT>> [as of October 19, 2020]

stakes, surveyor markings, etc.) indicating construction activities may occur on a specific plot. However, broad planning documents, such as land use master plans, conceptual master plans, or broad-based California Environmental Quality Act (CEQA) or National Environmental Policy Act (NEPA) documents that identify potential projects for an agency or facility are not considered common plans of development. For construction projects within a larger common plan of development or sale located at least one-quarter mile apart and the area between the projects is not being disturbed, each individual project may be regulated as a separate construction project if land for interconnecting road, pipeline, or utilities that is part of the same common plan is not concurrently being disturbed.

Construction Site Monitoring Program

Construction site monitoring program is a description of methods and procedures for monitoring discharges at a construction site.

Conveyance System

Conveyance system is a sewer, ditch, pipe, hose, swale, or any engineered feature that is designed to convey water or any combination of such components.

Debris

Debris is litter, rubble, discarded refuse, or remains of destroyed inorganic anthropogenic waste.

Demolition and Pre-Development Site Preparation

Demolition and pre-development site preparation is a construction stage including demolition of existing structures that expose soil, rough grading and/or disking, clearing and grubbing operations, or any soil disturbance prior to mass grading.

Detected Not Quantifiable

Detected not quantifiable is a sample result that is between the method detection limit and the minimum level or reporting limit.

Detention

Detention is the temporary storage of stormwater to improve quality or reduce the volumetric flow rate of discharge or both.

Dewatering

Dewatering is the process of removing excess water in an excavation or impoundment by pumping or other mechanical means.

Discharge Location

Discharge location is a common outlet from a construction site drainage area where stormwater, authorized non-stormwater, or dewatering discharge leaves the site or project boundary, or enters any on-site waters of the United States (e.g., a creek running through a site).

Discharger

The discharger is a person as defined in Water Code, § 13050(c), which includes companies and governmental bodies, subject to this General Permit. The discharger is responsible for compliance with this Permit, including work done by QSDs, QSPs, and QSP delegates. The following persons may serve as the discharger:

1. A person, company, agency, or other entity that possesses a real property interest (including, but not limited to, fee simple ownership, easement, leasehold, or other rights of way) in the land upon which the construction or land disturbance activities will occur for the regulated site.
2. For linear underground and overhead projects, the utility company, municipality, or other public or private company or agency that owns or operates the linear underground or overhead project.
3. For land controlled by an estate or similar entity, the person who has day-to-day control over the land (including, but not limited to, a bankruptcy trustee, receiver, or conservator).
4. For pollution investigation and remediation projects, any potentially responsible party that has received permission to conduct the project from the holder of a real property interest in the land.
5. For U.S. Army Corps of Engineers projects, the U.S. Army Corps of Engineers may provide written authorization to its bonded contractor to serve as the discharger, provided the U.S. Army Corps of Engineers is also responsible for compliance with the General Permit, as authorized by the Clean Water Act or the Federal Facilities Compliance Act.
6. For projects on public lands, a public agency with a real property interest in the land may provide written authorization via an encroachment permit to another public agency to serve as the discharger, provided that both public agencies remain responsible for compliance with this General Permit.

A contractor is qualified to be a discharger if the contractor satisfies one of the requirements above.

Dose Rate

In applied chemistry, dose rate is dose of a chemical per time unit (e.g., mg/day), sometimes also called dosage or injection rate.

Drainage Area

Drainage area is the area of land that drains water, sediment, pollutants, and dissolved materials to a common outlet or discharge location.

Duly Authorized Representative (DAR)

A Duly Authorized Representative is a named individual or position that has responsibility for the overall operation of the regulated construction project or activities

including, but not limited to, a superintendent, project manager, or other positions of equivalent or higher responsibility. Additionally, an individual or position that has overall responsibility for environmental matters for the owner or company may be designated as a Duly Authorized Representative. The Legally Responsible Person designates the Duly Authorized Representative through SMARTS, authorizing the Duly Authorized Representative to sign, certify, and electronically submit Permit Registration Documents, Notices of Termination, and any other supporting documents, reports, or information required by this General Permit, the State or Regional Water Boards, or U.S. EPA. A Duly Authorized Representative cannot be a contractor, consultant, or other third party.

Effective Date

An effective date is a date set by the State Water Resources Control Board (State Water Board) during the adoption of an Order, for the date that at least one or more of the Order provisions take effect and the previous Order is rescinded.

Effluent

Effluent is any discharge either to the receiving water or beyond the property boundary controlled by the discharger.

Effluent Limitation

An effluent limitation is any numeric or narrative restriction imposed on quantities, discharge rates, and concentrations of pollutants which are discharged from point sources into waters of the United States, the waters of the contiguous zone, or the ocean.

Erosion

Erosion is the process, by which soil particles are detached and transported by the actions of wind, water, or gravity.

Erosion Control BMPs

Erosion control BMPs is vegetation, such as grasses and wildflowers, and other materials, such as straw, fiber, stabilizing emulsion, protective blankets, rolled erosion control product, etc., placed to stabilize areas of disturbed soils, reduce loss of soil due to the action of water or wind, and prevent water pollution.

Field Measurements

Field measurements are results of testing procedures performed in the field with portable field-testing kits or meters.

Final Stabilization

Final stabilization is established when all soil disturbing activities at each individual parcel within the construction site have been completed, and the establishment of a permanent vegetative cover, or equivalent permanent stabilization measures (such as riprap, gabions, or geotextiles) to prevent erosion in a manner consistent with the requirements in this General Permit.

First Order Stream

A first order stream is a stream with no tributaries.

Flocculants

Flocculants are substances which promote the clumping of particles.

Forecasted Precipitation Event

Forecasted precipitation event is any weather pattern that is forecasted to have a 50 percent or greater chance of producing 0.5 inches of precipitation in a 24-hour period in the project area. The discharger shall obtain precipitation forecast information from the [National Weather Service Forecast Office](https://forecast.weather.gov) (e.g., by entering the zip code of the project's location at <https://forecast.weather.gov>). Precipitation events end when there are two sequential 24-hour periods with less than 0.25 inches of precipitation forecast for each period.

Full Capture System

A full capture system is a treatment control, or series of treatment controls, including but not limited to, a multi-benefit project or a low impact development control that traps all particles that are 5mm or greater, and has a design treatment capacity that is either:

1. Of not less than the peak flow rate, Q , resulting from a one-year, one-hour, storm in the subdrainage area; or
2. Appropriately sized to, and designed to, carry at least the same flows as the corresponding storm drain.

Full Capture System Equivalency

Full capture system equivalency is the trash load that would be reduced if full capture systems were installed, operated, and maintained for all storm drains that capture runoff from the relevant areas of land (e.g., facilities or sites regulated by NPDES permits for discharges of stormwater associated with industrial activity, including construction activity). The full capture system equivalency is a trash load reduction target that the permittee quantifies by using an approach, and technically acceptable and defensible assumptions and methods for applying the approach, subject to the approval of the permitting authority.

Good Housekeeping BMPs

Good housekeeping BMPs are designed to reduce or eliminate the addition of pollutants to construction site runoff through analysis of pollutant sources, implementation of proper handling/disposal practices, employee education, and other actions.

Grading and Land Development Phase

Grading and land development phase includes reconfiguring the topography and slope, including: alluvium removals; canyon cleanouts; rock undercuts; keyway excavations; landform grading; and stockpiling of select material for capping operations.

Groundwater

Groundwater is water that exists underground in saturated zones beneath the land surface.

Hydraulically Downgradient

Hydraulically downgradient is the direction of stream flow towards a lower elevation.

Hydromodification

Hydromodification is the alteration of the hydrologic characteristics of coastal and non-coastal waters, which in turn could cause degradation of water resources.

Hydromodification can cause excessive erosion and/or sedimentation rates, causing excessive turbidity, channel aggradation and/or degradation.

Inactive Project

Inactive project is where all construction activities (including passive treatment technology, active treatment systems, and/or active equipment), are fully stabilized and will be suspended for 30 days or more.

Infeasible

Infeasible means that the discharger has demonstrated that the specific requirement is not technologically possible, or not economically practicable and achievable in light of best industry practices.

K Factor

The K factor is the soil erodibility factor used in the Revised Universal Soil Loss Equation (RUSLE). The K factor represents the combination of detachability of the soil, runoff potential of the soil, and the transportability of the sediment eroded from the soil.

Legally Responsible Person

The Legally Responsible Person is a representative of a permittee and signatory that is legally designated to sign, certify, and electronically submit any documents required by the General Permit, the State or Regional Water Board, or U.S. EPA. An LRP must be one of the following:

1. For a corporation or limited liability company: a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (a) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation or limited liability company; or (b) the manager of the facility if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;
2. For a partnership or sole proprietorship: a general partner or the proprietor, respectively;
3. For a municipality, state, federal, or other public agency: a principal executive officer, ranking elected official, city manager, council president, or any other authorized

public employee with managerial responsibility over the construction or land disturbance project (including, but not limited to, project manager, project superintendent, or resident engineer);

4. For an individual: the individual; or
5. For any type of entity not listed above (e.g., trusts, estates, receivers): an authorized person with managerial authority over the construction or land disturbance project.

Maximum Allowable Threshold Concentration

Maximum allowable threshold concentration is the allowable concentration of residual, or dissolved, coagulant/flocculant in effluent. The MATC shall be coagulant/flocculant-specific, and based on toxicity testing conducted by an independent, third-party laboratory. Typically, the MATC is equal to the geometric mean of the NOEC (No Observed Effect Concentration) and LOEC (Lowest Observed Effect Concentration) Acute and Chronic toxicity results for most sensitive species determined for the specific coagulant. The most sensitive species test shall be used to determine the MATC.

Method Detection Limit

Method detection limit is the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero.

Minimum Level or Reporting Limit

Minimum level or reporting limit is the lowest level at which the entire analytical system must give a recognizable signal and acceptable calibration point for the analyte. It is equivalent to the concentration of the lowest calibration standard in a method, assuming that all method-specified sample weights, volumes, and cleanup procedures have been employed.

Multi-Benefit Project

Multi-benefit project is a treatment control project designed to achieve the benefits set forth in California Water Code § 10562, subdivision (d). Examples include projects designed to: infiltrate, recharge, or store stormwater for beneficial reuse; develop or enhance habitat and open space through stormwater and non-stormwater management; and/or reduce stormwater and non-stormwater runoff volume.

Natural Channel Evolution

Natural channel evolution is the physical trend in channel adjustments following a disturbance that causes the river to have more energy and degrade or aggrade more sediment. Channels have been observed to pass through 5 to 9 evolution types. Once a channel passes through the suite of evolution stages, the channel will rest in a new state of equilibrium.

Non-Detect

Non-detect is a sample result represented by “ND” in which the concentration of the subject pollutant analyte is less than the method detection limit, and therefore not detectable by the laboratory method and/or equipment used.

Non-Stormwater Discharges

Non-stormwater discharges are discharges that do not originate from precipitation events. They can include, but are not limited to, discharges of process water, air conditioner condensate, non-contact cooling water, vehicle wash water, sanitary wastes, concrete washout water, paint wash water, irrigation water, dust control over-wetting, or pipe testing water.

Non-Stormwater Pollution Controls

Non-stormwater pollution controls are the general site and materials management measures that directly or indirectly aid in minimizing the non-stormwater originated discharge of sediment and other construction related pollutants from the construction site.

Non-Structural Controls

Non-structural controls are best management practices that do not involve a structured or engineered solution. Non-structural controls include measures including education, site planning, and stormwater management regulations.

Non-Visible Pollutants

Non-visible pollutants associated with a specific site or activity that can have a negative impact on water quality but cannot be seen through observation (e.g., chlorine).

Numeric Action Level

A numeric action level (e.g., a pH range, turbidity value, or concentration) is a level that triggers a required evaluation of the effectiveness of best management practices implemented on the subject construction site, and the required implementation of additional corrective actions necessary to reduce the subject pollutant below the numeric action level. The numeric action level compliance location applies to each sample location and/or corresponding discharge location.

Numeric Action Level Exceedance

Non-TMDL numeric action level exceedance: A numeric action level exceedance occurs when the field reading for the one sample taken during each day of a qualifying precipitation event at each sample and/or discharge location, exceeds an applicable numeric action level. A numeric action level exceedance is not a violation of this General Permit. A discharger failing to report and failing to modify implementation of its best management practices to prevent further numeric action level exceedance(s), is a violation of this General Permit.

TMDL-related numeric action level exceedance: A TMDL-related numeric action level exceedance occurs on the second, and each subsequent, analytical result for samples taken from any and all discharge location(s) within the same drainage area, during the

same reporting year and taken in accordance with Attachment D or E Section III.D.3, that is above the concentration set forth in an applicable numeric action level. A numeric action level exceedance is not a violation of this General Permit; however, it is a violation when the discharger fails to report and respond to the numeric action level exceedance(s).

Numeric Effluent Limitation

Numeric effluent limitation is a technology-based or water quality-based limit (e.g., pH range, turbidity value, or concentration) established for discharges covered under this General Permit. The numeric effluent limitation compliance location(s) applies to each sample and/or discharge location at the point of discharge from an active treatment system if applicable.

Numeric Effluent Limitation Exceedance

Active treatment system numeric effluent limitation exceedance: An active treatment system numeric effluent limitation exceedance occurs when the analytical result for the samples taken during operation of an active treatment system exceeds an applicable numeric effluent limitation. A numeric effluent limitation exceedance is a violation of this General Permit and subject to mandatory minimum penalties.

TMDL-related numeric effluent limitation exceedance: A TMDL-related numeric effluent limitation exceedance occurs on the second, and each subsequent, analytical result for samples taken from any and all discharge location(s) within the same drainage area, during the same reporting year and taken in accordance with Attachment D or E Section III.D.3, that is above the concentration set forth in an applicable numeric effluent limitation. Each numeric effluent limitation exceedance after the first instance is a violation of this General Permit and subject to mandatory minimum penalties.

Passive Treatment

Passive treatment is the application of natural or synthetic chemicals and products to reduce turbidity in discharges through coagulation and flocculation. Passive treatment does not rely on computerized, enclosed systems with pumps, filters, and real-time controls. Passive treatment may include pumps where they are necessary to move water around the construction site.² Passive treatment products are available in a variety of forms and may be land-applied for soil stabilization (e.g., bonded fiber matrixes, hydromulches) or water-applied for sediment removal (e.g., liquid treatment chemicals, powders, slow-releasing solid blocks/socks).

Permanent Control Measures

Permanent control measures are the erosion prevention materials designed to provide long-term protection to underlying soils. This may include, but is not limited to buildings, paving a uniform (evenly distributed, without large bare areas) perennial vegetative cover, riprap, gabions, or biodegradable rolled erosion control products (RECP).

² [U.S. EPA. 2017 Construction General Permit](https://www.epa.gov/npdes/epas-2017-construction-general-permit-cgp-and-related-documents). Web. January 11, 2017.
<<https://www.epa.gov/npdes/epas-2017-construction-general-permit-cgp-and-related-documents>> [as of October 19, 2020]

pH

pH is the unit universally used to express the intensity of the acid or alkaline condition of a water sample. The pH of natural waters tends to range between 6 and 9, with neutral being 7. Extremes of pH can have deleterious effects on aquatic systems.

Post-Construction BMPs

Post-construction BMPs are structural and non-structural controls which detain, retain, infiltrate, and/or filter out pollutants discharged to receiving waters after a construction project is completed. Low impact development features are considered a type of post-construction BMP.

Precipitation Event

Precipitation event is any weather pattern that results in precipitation (rain, snow, sleet, or hail).

Programmatic Permitting

Programmatic permitting is an approach for linear underground and overhead project dischargers to obtain General Permit coverage for multiple non-contiguous sites with similar scope and construction activities, that are located within one Regional Water Board boundary and have the same Legally Responsible Person.

Project

Project is the area that includes sites where land is disturbed and also includes the areas of activities that do not disturb land.

Property Boundary

Property boundary or the area enclosed by the property lines. Property boundary includes project area and sites.

Qualified SWPPP Developer (QSD)

Qualified SWPPP developer is a qualified stormwater professional authorized by the discharger to develop and revise SWPPPs.

Qualified SWPPP Practitioner (QSP)

Qualified SWPPP practitioner is a qualified stormwater professional authorized by the discharger to conduct non-stormwater and stormwater visual observations, sampling, and implementation of all elements of the SWPPP.

Qualifying Precipitation Event

Qualifying precipitation event is any weather pattern that is forecast to have a 50 percent or greater Probability of Precipitation (PoP) and a Quantitative Precipitation Forecast (QPF) of 0.5 inches or more within a 24-hour period. The event begins with the 24-hour period when 0.5 inches has been forecast and continues on subsequent 24-hour periods when 0.25 inches of precipitation or more is forecast.

R Factor

R factor is the erosivity factor used in the Revised Universal Soil Loss Equation (RUSLE). The R factor represents the erosivity of the climate at a particular location. An average annual value of R is determined from historical weather records using erosivity values determined for individual storms. The erosivity of an individual storm is computed as the product of the storm's total energy, which is closely related to storm amount, and the storm's maximum 30-minute intensity.

Regional Water Quality Control Board (Regional Water Board)

A Regional Water Board is a semi-autonomous board comprised of board members appointed by the Governor and confirmed by the state Senate. California has nine Regional Water Boards with jurisdictions based on watersheds. A Regional Water Board may delegate its authority to the executive officer to the board, or other designated staff.

Remaining Sub-Sampled Material

Remaining sub-sampled material is the material (for example: organic material, gravel, etc.) that remains after the organisms to be identified have been removed from the subsample for identification. (Generally, no macroinvertebrates are present in the remaining subsampled material, but the sample needs to be checked and verified using a complete Quality Assurance (QA) plan).

Reporting Period

A reporting period is a specified period of time in which pertinent report information is applicable. For example, a standard reporting period in this Order is July 1 through June 30 of each year.

Responsible Discharger

Responsible dischargers are dischargers who:

1. Discharge stormwater and authorized non-stormwater directly, or through a municipal separate sewer system (MS4) or other conveyance, to impaired water bodies or watersheds identified in a U.S. EPA-approved TMDL with a waste load allocation assigned to construction stormwater sources; and
2. Have identified, through the site-specific pollutant source assessment, that one or more pollutants specific to the TMDL are present on-site with the potential to enter construction stormwater discharges.

Revised Universal Soil Loss Equation (RUSLE)

Revised universal soil loss equation is the empirical model that calculates average annual soil loss as a function of rainfall and runoff erosivity, soil erodibility, topography, erosion controls, and sediment controls.

Revised Universal Soil Loss Equation 2 (RUSLE2)

Revised universal soil loss equation 2 is the updated Windows®-based empirical model that calculates average annual soil loss as a function of rainfall and runoff erosivity, soil

erodibility, topography, erosion controls, and sediment controls. This includes subsequent equivalent versions of this model.

Routine Maintenance

Routine maintenance are activities intended to maintain the original line and grade, hydraulic capacity, and/or original purpose of a facility. The Order further defines routine maintenance (Section II.B.1) for road and highway projects as the replacement of the structural section, but not when the activity exposes the underlying soil or erodible subgrade. The road surface and base are not part of the subgrade. As such, those portions of a project that remove the paved road surface and base down to the erodible subgrade and/or underlying soil would not be considered routine maintenance.

Runoff Control BMPs

Runoff control BMPs are designed to control the peak volume and flow rate, or prevent scour due to concentrated flows.

Run-on

Run-on are discharges that originate offsite and flow onto the property of a separate project site.

Sampling Location

Sampling location for traditional construction projects: An identified discharge location where samples of stormwater, non-stormwater, or dewatering discharges are obtained to determine compliance with requirements in this General Permit.

Sampling location for linear underground and overhead projects: An identified discharge location, representative of the project's construction activities, where samples of stormwater, non-stormwater, or dewatering discharges are obtained to determine compliance with requirements in this General Permit.

Secondary Containment

Secondary containment is a device or control measure in addition to the primary containment that is used to stop a discharge of pollutants or hazardous material from leaving a specified area.

Sediment

Sediment is solid particulate matter, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice and has come to rest on the earth's surface either above or below sea level.

Sediment Control BMPs

Sediment control BMPs are practices and controls that trap soil particles after erosion by rain, flowing water, or wind. They include those practices that intercept and slow or detain the flow of stormwater to allow sediment to settle and be trapped (e.g., silt fence, sediment basin, fiber rolls, etc.).

Sedimentation

Sedimentation is the process of deposition of suspended matter carried by water, wastewater, or other liquids, by gravity. It is usually accomplished by reducing the velocity of the liquid below the point at which it can transport the suspended material.

Sensitive Watershed

Sensitive watershed is a watershed draining into a receiving water body listed on the State Water Board's approved CWA 303(d) list for sedimentation/siltation, turbidity, or a water body designated with beneficial uses of cold, spawn, and migratory.

Settleable Solids

Settleable solids is a solid material that can be settled within a water column during a specified time frame. It is typically tested by placing a water sample into an Imhoff settling cone and then allowing the solids to settle by gravity for a given length of time. Results are reported either as a volume of milliliter per liter (mL/L) or as a concentration (milligrams per liter (mg/L)).

Sheet Flow

Sheet flow is overland flow of water that occurs in areas where there are no defined channels where the water spreads out over a large area at a uniform depth.

Site

A site is the area disturbed where the construction activity is physically located or conducted, including staging, storage, and access areas.

Site Operating Hours

Site operating hours are the time periods when the site is staffed to conduct any function related to the construction activity.

Soil Amendment

A soil amendment is any material that is added to the soil to change its chemical properties, engineering properties, or erosion resistance that could become mobilized by stormwater.

Source

Source is any construction activity, material, or area that causes or contributes to pollutants in stormwater.

Stormwater

Stormwater is rain, snowmelt, or any other liquid or solid precipitation that may result in runoff, and drainage from a site.

Streets and Utilities Phase

Streets and utilities phase is the construction stage including excavation and street paving, lot grading, curbs, gutters and sidewalks, public utilities, public water facilities including fire hydrants, public sanitary sewer systems, storm sewer system, and/or other drainage improvements.

Structural Controls

Structural controls are any structural facility or fabrication designed and constructed to mitigate the adverse impacts of stormwater and urban runoff pollution.

Surface Runoff

Surface runoff is the portion of stormwater that does not infiltrate into the ground or evaporate, but instead flows overland onto adjacent land or watercourses or is routed to stormwater conveyance systems.

Topsoil

Topsoil is the uppermost part of the soil profile, which is the most favorable material for plant growth. It is typically rich in organic matter.

Total Maximum Daily Load (TMDL)

A TMDL is the sum of the maximum amount of a pollutant that a waterbody can receive per day and still meet state water quality standards. It is the sum of the individual Waste Load Allocations (WLAs) for point sources, the load allocations for nonpoint and natural background sources, and the margin of safety.

Total Suspended Solids (TSS)

The measure of total suspended solids is the measure of the suspended solids in a water sample which includes inorganic substances, such as soil particles and organic substances, such as algae, aquatic plant/animal waste, particles related to industrial/sewage waste, etc. The TSS test measures the concentration of suspended solids in water by measuring the dry weight of a solid material contained in a known volume of a sub-sample of a collected water sample. Results are reported in mg/L.

Toxicity

Toxicity is the adverse response(s) of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies.

Trash

Trash is all improperly discarded solid material from any production, manufacturing, or processing operation including, but not limited to, products, product packaging, or containers constructed of plastic, steel, aluminum, glass, paper, or other synthetic or natural materials.

Tributary

Tributary is a smaller river or stream that flows into a larger river or stream.

Turbidity

Turbidity is the optical condition and cloudiness of water caused by suspended or dissolved particles or colloids. Turbidity is quantified by the degree to which light traveling through a water column is scattered by the suspended organic and inorganic particles it contains. The turbidity test is reported in Nephelometric Turbidity Units (NTU) or Jackson Turbidity Units (JTU) with a calibrated turbidity meter.

Vertical Construction Phase

Vertical construction phase is the build out of structures from foundations to roofing, including rough landscaping.

Waste Load Allocation (WLA)

Waste load allocation is the portion of a receiving water's loading capacity that is allocated to one of its existing or future point sources of pollution.

Water Effect Ratio (WER)

Water effect ratio is a factor that can be used per U.S. EPA water quality criteria (WQC) regulations, to customize national aquatic life criteria to reflect site-specific water column conditions. The WER is used to derive site-specific criteria that maintain the level of protection of aquatic life intended by the "Guidelines for deriving numerical national WQC" (U.S. EPA 1985).

Waters of the United States

Waters of the United States is defined by the federal Environmental Protection Agency in 40 Code of Federal Regulations § 122.2.

Water Quality Objectives (WQO)

Water quality objectives are defined in the California Water Code as limits or levels of water quality constituents or characteristics, which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area.

Water Quality Standards

Water quality standards consists of beneficial uses, water quality objectives to protect those uses, an antidegradation policy, and policies for implementation. Water quality standards are established in Regional Water Quality Control Plans (Basin Plans) and statewide Water Quality Control Plans. U.S. EPA has also adopted water quality criteria (the same as objectives) for California in the National Toxics Rule and California Toxics Rule.

ATTACHMENT C

CONTACTS

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
GENERAL PERMIT FOR STORMWATER DISCHARGES ASSOCIATED
WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES
(GENERAL PERMIT)

State Water Resources Control Board

www.waterboards.ca.gov

P.O. Box 1977

Sacramento, CA 95812-1977

stormwater@waterboards.ca.gov

Division of Financial Assistance: (916) 341-5700

Division of Water Quality: (916) 341-5455

Office of Enforcement: (916) 341-5272

Office of Public Affairs: (916) 341-5254

Office of Legislative Affairs: (916) 341-5251

Office of the Ombudsman: (916) 341-5254



STATE WATER RESOURCES CONTROL BOARD
REGIONAL WATER QUALITY CONTROL BOARDS

ATTACHMENT C

Regional Water Quality Control Board Stormwater Program Contacts

NORTH COAST REGION (1)

r1_stormwater@waterboards.ca.gov
5550 Skylane Boulevard, Suite A
Santa Rosa, CA 95403
(707) 576-2220

CENTRAL COAST REGION (3)

r3_stormwater@waterboards.ca.gov
895 Aerovista Place, Suite 101
San Luis Obispo, CA 93401
(805) 549-3147

CENTRAL VALLEY REGION (5S)

r5s_stormwater@waterboards.ca.gov
11020 Sun Center Drive, Suite 200
Rancho Cordova, CA 95670-6114
(916) 464-3291

FRESNO BRANCH OFFICE (5F)

r5f_stormwater@waterboards.ca.gov
1685 E Street
Fresno, CA 93706
(559) 445-5116

VICTORVILLE BRANCH OFFICE (6V)

r6b_stormwater@waterboards.ca.gov
15095 Amargosa Road—Bldg 2,
Suite 210
Victorville, CA 92394
(760) 241-6583

SANTA ANA REGION (8)

r8_stormwater@waterboards.ca.gov
3737 Main Street, Suite 500
Riverside, CA 92501-3348
(951) 782-4130

SAN FRANCISCO BAY REGION (2)

r2stormwater@waterboards.ca.gov
1515 Clay Street, Suite 1400
Oakland, CA 94612
(510) 622-2402

LOS ANGELES REGION (4)

r4_stormwater@waterboards.ca.gov
320 W. 4th Street, Suite 200
Los Angeles, CA 90013
(213) 576-6600

REDDING BRANCH OFFICE (5R)

r5r_stormwater@waterboards.ca.gov
364 Knollcrest Drive, Suite 205
Redding, CA 96002
(530) 224-4845

LAHONTAN REGION (6SLT)

r6a_stormwater@waterboards.ca.gov
2501 Lake Tahoe Blvd
South Lake Tahoe, CA 96150
(530) 542-5400

COLORADO RIVER REGION (7)

r7_stormwater@waterboards.ca.gov
73-720 Fred Waring Drive, Suite 100
Palm Desert, CA 92260
(760) 346-7491

SAN DIEGO REGION (9)

r9_stormwater@waterboards.ca.gov
2375 Northside Drive, Suite 100
San Diego, CA 92108-2700
(619) 516-1990

STORMWATER STAFF DIRECTORY

https://www.waterboards.ca.gov/water_issue/s/programs/stormwater/contact.html



STATE WATER RESOURCES CONTROL BOARD
REGIONAL WATER QUALITY CONTROL BOARDS

ATTACHMENT D

TRADITIONAL CONSTRUCTION RISK LEVEL REQUIREMENTS

**NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
GENERAL PERMIT FOR STORMWATER DISCHARGES
ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES
(GENERAL PERMIT)**

I. GENERAL REQUIREMENTS

Risk Level 1, 2, and 3 dischargers shall implement the following minimum best management practices (BMPs) to reduce or prevent pollutants in construction stormwater discharges, monitoring requirements, and reporting requirements. If a requirement in this attachment does not specify a specific Risk Level, then the requirement applies to Risk Level 1, 2, and 3 dischargers.

II. MINIMUM BEST MANAGEMENT PRACTICES

II.A. Good Site Management "Housekeeping"

- II.A.1. Dischargers shall implement good site management (i.e., "housekeeping") measures for construction materials that could potentially be a threat to water quality if discharged or exposed to stormwater. At a minimum, dischargers shall implement the following good housekeeping measures:
- a. Identify and protect the products used and/or expected to be used and the end products that are produced and/or expected to be produced from exposure to stormwater. Products do not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (e.g., poles, equipment pads, cabinets, conductors, insulators, bricks, roofing, and siding);
 - b. Apply BMPs to erodible stockpiled construction materials (e.g., soil, spoils, fly-ash, stucco, hydrated lime) to prevent erosion and pollutant transport;
 - c. Store chemicals in watertight containers with secondary containment to prevent any spillage or leakage or store in a completely enclosed storage area;
 - d. Minimize exposure of construction materials to precipitation. Construction materials do not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (e.g., poles, equipment pads, cabinets, conductors, insulators, bricks);
 - e. Implement BMPs to control the off-site tracking of sediment and loose construction and landscape materials; and
 - f. Implement BMPs to control the discharge of plastic materials and limit the use of plastic materials when more sustainable, environmentally friendly alternatives exist. Dischargers shall consider the use of plastic materials resistant to solar degradation where plastic materials are deemed necessary.

- II.A.2. Dischargers shall implement good housekeeping measures for waste management, which, at a minimum, shall consist of the following:
- a. Minimize the discharge of pollutants from equipment and vehicle washing, wheel wash water, masonry wash waters, and other wash waters. Wash waters shall be captured and treated prior to discharge, or disposed of at a permitted facility that can accept that waste, to mitigate impacts to water quality;
 - b. Provide containment (e.g., secondary containment) of sanitation facilities (e.g., portable toilets) to prevent discharges of pollutants to the stormwater drainage system or receiving water;
 - c. Clean or replace sanitation facilities and inspect them regularly for leaks and spills;
 - d. Keep debris or trash in waste containers if it is subject to transport from the site by wind or runoff;
 - e. Cover waste disposal containers at the end of every business day and during a precipitation event;
 - f. Prevent discharges from waste disposal containers to the stormwater drainage system or receiving water (e.g., containers with solid bottoms and regular maintenance);
 - g. Contain and securely protect stockpiled waste material from wind and precipitation unless actively being used; and
 - h. Secure and contain concrete washout areas and other washout areas that may contain additional pollutants to minimize discharge into the underlying soil and onto surrounding areas. Washout areas shall be covered prior to and during a precipitation event.
- II.A.3. Dischargers shall implement good housekeeping for vehicle/equipment storage and maintenance, which shall consist of the following:
- a. Contain fuel, grease, and oil to prevent them from leaking into ground, storm drains, or surface waters;
 - b. Place all equipment or vehicles, which are to be fueled, maintained, and/or stored in a designated area with BMPs installed; and
 - c. Clean leaks immediately and dispose of leaked materials properly in accordance with the law.
- II.A.4. Dischargers shall implement good housekeeping for landscape materials, which shall consist of the following:
- a. Contain and protect stockpiled materials such as mulches and topsoil, or other erodible landscape materials, from wind and precipitation unless being actively used;
 - b. Contain packaged landscape materials (e.g., fertilizers) when they are not being actively used;

- c. Discontinue the application of any erodible landscape material at least 2 days before a forecasted precipitation event as defined in Attachment B or during periods of precipitation; and
 - d. Apply erodible landscape material at quantities and rates in accordance with manufacturer recommendations or based on written specifications by knowledgeable and experienced field personnel;
- II.A.5. Dischargers shall implement good housekeeping measures on the construction site to control the aerial deposition of site materials and from site operations. Such particulates can include, but are not limited to, metals, nutrients, organics, sediment, other particulates, and trash.
- II.A.6. Dischargers shall document all housekeeping BMPs in the SWPPP that correspond to the nature and phase of the construction activities. Construction phases at traditional land development projects include demolition and pre-development site preparation phase, grading and land development phase, streets and utilities phase, vertical construction phase, and final landscaping and site stabilization phase.

II.B. Non-Stormwater Management

- II.B.1. Dischargers shall implement the following measures to control all non-stormwater discharges during construction:
- a. Wash vehicles in such a manner as to prevent non-stormwater discharges to surface waters or municipal separate sewer system drainage systems;
 - b. Clean streets in such a manner as to prevent unauthorized non-stormwater discharges from reaching surface water or municipal separate sewer system drainage systems; and
 - c. Eliminate any non-stormwater discharges not authorized in Section IV.A of this General Permit's Order.

II.C. Preserve Existing Topsoil

- II.C.1. Dischargers shall preserve existing topsoil, unless infeasible, through the following practices:
- a. Stockpiling existing topsoil, or transferring topsoil to other locations, to deploy and reestablish vegetation prior to termination of coverage; and
 - b. Stabilizing disturbed topsoil during construction.

Preserving existing topsoil is not required where the intended function of a specific area of the site dictates that the topsoil be disturbed or removed.¹

¹ Examples may include the removal of topsoil containing invasive seedbanks, lack of space to stockpile topsoil, and sites that are designed to be highly impervious after construction with little to no vegetation intended to remain.

II.D. Erosion Control

- II.D.1. Dischargers shall implement the following practices to eliminate or minimize site erosion. Erosion control BMPs (except for sprayed products) shall be available on-site or at a nearby location (e.g., common lay-down yard), year-round with trained persons able to deploy the product under the direction of the Qualified SWPPP Practitioner:
- a. Implement effective wind erosion control;
 - b. Preserve existing vegetation;
 - c. Minimize the amount of soil exposed during construction activity;
 - d. Minimize the disturbance of steep slopes;
 - e. Schedule earthwork to minimize the amount of disturbed area when feasible;
 - f. Immediately initiate stabilization for disturbed areas whenever earth disturbing activities have permanently ceased on any portion of the site, or temporarily ceased on any portion of the site and will not resume for a period exceeding 14 calendar days;²
 - g. Minimize soil compaction in areas other than where the intended function of a specific area dictates that it be compacted;
 - h. Reestablish vegetation or non-vegetative erosion controls as soon as practicable;
 - i. If feasible, divert up gradient run-on water from contacting areas of exposed soils disturbed by construction activities or convey run-on through the site in a manner that prevents erosion from areas of construction and does not compromise the effectiveness of erosion, sediment, and perimeter controls;
 - j. Run-on water flowing onto a site from off-site areas may be separated from a site's stormwater discharge to eliminate commingled contribution. Run-on diversion shall occur prior to entering an area affected by construction activity. Run-on flow diversion shall be conveyed through or around the construction activity in plastic pipe or an engineered conveyance channel in a manner that will not cause erosion due to flow diversion. Run-on combined with a site's stormwater discharge is considered a stormwater discharge.
 - k. Limit the use of plastic materials when more sustainable, environmentally friendly alternatives exist. Where plastic materials are deemed necessary, the

² In arid, semiarid, and drought-stricken areas where initiating vegetative stabilization measures immediately is infeasible, alternative stabilization measures shall be employed as specified by the Regional Water Board. Stabilization shall be completed within a period of time determined by the Regional Water Board. In limited circumstances stabilization may not be required if the intended function of a specific area of the site necessitates that it remains disturbed.

discharger shall consider the use of plastic materials resistant to solar degradation;

- I. Control stormwater and non-stormwater discharges to minimize downstream channel and bank erosion; and
- m. Control peak flowrates and total volume of stormwater and authorized non-stormwater discharges to minimize channel and streambank erosion and scour in the immediate vicinity of discharge points.

II.D.2. Dischargers that stabilize soil using bonded-fiber matrices, hydromulches, spray tackifiers, or other land-applied products shall:

- a. Apply the product according to the manufacturer's instructions and guidance; and
- b. Apply the product according to the manufacturer's guidance to allow for ample cure time and to prevent treatment chemicals from being transported by runoff.

II.E. Sediment Controls

II.E.1. Dischargers shall implement the following site sediment controls:

- a. Establish and maintain effective perimeter controls;
- b. Stabilize all construction entrances and exits to sufficiently control erosion and sediment discharges from the site; and
- c. Design, install, and maintain effective sediment controls to minimize the discharge of pollutants utilizing site-specific BMPs.

At a minimum, design sediment basins and impoundments according to the method provided in the California Stormwater Quality Association Construction BMP Handbook³ and utilize outlet structures that withdraw water from the surface. Dischargers utilizing sediment basins shall complete installation prior to other land disturbance activities.

II.F. Additional Risk Level 2 and 3 Requirements:

II.F.1. Risk Level 2 and 3 dischargers shall implement the following additional erosion and sediment control BMPs for areas under active⁴ construction:

3 California Stormwater Quality Association (CASQA), [Construction BMP Handbook](https://www.casqa.org/sites/default/files/casqa-handbook-construction/master_hanbook_file_2015_sec.pdf) (January 2015), <https://www.casqa.org/sites/default/files/casqa-handbook-construction/master_hanbook_file_2015_sec.pdf> [as of May 20, 2021] (CASQA Construction BMP Handbook)

4 Active areas of construction are areas undergoing land surface disturbance and associated site areas. This includes construction activity during the preliminary phase, mass grading phase, streets and utilities phase, and the vertical construction phase.

- a. Design and construct cut and fill slopes in a manner to ensure slope stability and to minimize erosion including, but not limited to, these practices:
 - i. Reduce continuous slope length using terracing and diversions;
 - ii. Reduce slope steepness; and
 - iii. Roughen slope surfaces with large cobble or track walking.
- b. Install linear sediment controls along the toe of the slope, face of the slope, and at the grade breaks of exposed slopes according to sheet flow lengths as shown in Table 1 until the slope has reached Notice of Termination conditions for erosion protection. When infeasible to comply with Table 1 due to site-specific geology or topography, the QSD shall include in the SWPPP a justification for the use of an alternative method to protect slopes from erosion and sediment loss.

Table 1 - Critical Slope and Sheet Flow Length Combinations for Linear Sediment Reduction Barrier

Slope Ratio (Vertical to Horizontal)	Sheet flow length not to exceed
$\leq 1:20$	Per QSD's specification.
$> 1:20$ to $\leq 1:4$	35 feet
$> 1:4$ to $\leq 1:3$	20 feet
$> 1:3$ to $\leq 1:2$	15 feet
$> 1:2$	10 feet

- II.F.2. Limit construction activity traffic to and from the project to entrances and exits that employ effective controls to prevent off-site tracking of sediment.
- II.F.3. Maintain and protect all storm drain inlets, perimeter controls, and BMPs at entrances and exits (e.g., tire wash off locations).
- II.F.4. Remove any excess sediment or other construction activity-related materials that are deposited on the impervious roads by vacuuming or sweeping prior to any precipitation event.
- II.F.5. Implement additional site-specific sediment controls upon written request by the Regional Water Boards when the implementation of the other requirements in this Section are determined to inadequately protect the site's receiving water(s).

II.G. Surface Water Buffer⁵

- II.G.1. Dischargers shall provide and maintain natural buffers and/or equivalent erosion and sediment controls when a water of the U.S. is located within 50 feet of the site's earth disturbances, unless infeasible.
- II.G.2. Dischargers shall comply with one of the following alternatives for any discharges to waters of the U.S. located within 50 feet of a site's earth disturbances:
 - a. Provide and maintain a 50-foot undisturbed natural buffer from the edge of the disturbed area to the top of bank;
 - b. Provide and maintain an undisturbed natural buffer that is less than 50 feet and is supplemented by erosion and sediment controls that achieve, in combination, the sediment load reduction equivalent to a 50-foot undisturbed natural buffer. The equivalent sediment load may be calculated using RUSLE2 or another method approved by the Regional Water Board; or
 - c. Implement erosion and sediment controls to achieve the sediment load reduction equivalent to a 50-foot undisturbed natural buffer when infeasible to provide and maintain an undisturbed natural buffer of any size. The equivalent sediment load may be calculated using RUSLE2 or another method approved by the Regional Water Board.

II.H. Pesticide Application

Dischargers shall only apply pesticides that have been authorized for use through California Department of Pesticide Regulation. The application of pesticides shall follow manufacturer's guidance.

II.I. Demolition of Existing Structure

Dischargers shall prevent exposing demolition materials to precipitation. Demolition materials should be covered with an impermeable barrier such as, but not limited to, plastic sheeting prior to precipitation to prevent known contaminants from being mobilized. Dischargers unable to cover demolished material that were not previously investigated or found to be absent of applicable pollutants in reportable quantities shall sample for any non-visible pollutants that may be in stormwater

⁵ The surface water buffer requirements apply to work above the top-of-bank or high-water level of waters of the United States. Work within a channel or streambed (water body-dependent construction), Clean Water Act § 404 projects with a § 401 certification, and projects where no natural surface buffer exists (e.g., concrete channelization) are exempt from the requirements. All types of in-channel work may be regulated under § 401 (Clean Water Act - Regional Boards), § 404 (Clean Water Act - Army Corps of Engineers), or §1602 (California Fish and Game Code).

discharges such as, but not limited to, asbestos, leaded paint, or Poly Chlorinated Biphenyls (PCBs)⁶.

II.J. Maintenance and Repair

- II.J.1. Dischargers shall begin maintaining, repairing, and/or implementing design changes (reviewing alternatives that have not been used yet) to BMPs within 72 hours of identification of failures or other shortcomings and complete the changes as soon as possible, prior to the next forecasted precipitation event.
- II.J.2. Dischargers shall have a Qualified SWPPP Practitioner (QSP) verify all BMP maintenance and repairs were appropriately implemented during the next visual inspection following completion. The QSP may delegate BMP maintenance and repair verification to an appropriately trained delegate.

III. MONITORING REQUIREMENTS

III.A. General Requirements

The monitoring requirements of this Section are issued pursuant to Water Code § 13383 and specifies monitoring requirements for dischargers subject to this Order.

All dischargers shall implement the Construction Site Monitoring Program in compliance with this Section at the time of the commencement of construction activity and shall continue implementation until the project is complete and the project site is stabilized as defined in Section III.H in the Order.

III.B. Monitoring Exceptions

- III.B.1. Dischargers shall conduct visual inspections and collect samples to meet the requirements of this Attachment. Dischargers are not required to physically conduct visual inspections or collect samples under the following conditions:
 - a. During dangerous weather conditions such as electrical storms, flooding, and high winds above 40 miles per hour;
 - b. Outside of scheduled site operating hours; or
 - c. When the site is not accessible to personnel.
- III.B.2. For inactive projects, dischargers may reduce the visual inspection frequency and suspend sampling per Section III.G of the Order. Dischargers shall provide an explanation with supporting information for all missed visual inspections or sampling required by this Attachment, to be included in the Annual Report.

6 PCBs were used between January 1, 1950 and January 1, 1980 and should be considered to be potentially present in structures built during that timeframe. "Structure", in this instance, shall have been constructed with floor space (such as a building).

III.C. Visual Inspection Requirements

- III.C.1. Dischargers shall perform visual inspections, based on their Risk Level, in accordance with Table 2 below. The purpose of visual inspections is, to identify and record BMPs that need maintenance to operate effectively, that have failed, or that could fail to operate as intended. Except as specified in Section III.C.3 below, inspectors shall be the Qualified SWPPP Developer, Qualified SWPPP Practitioner, or be trained by the Qualified SWPPP Practitioner.

Table 2 – Visual Inspection Schedule⁷

Risk Level	Weekly	Pre-Qualifying Precipitation Event	During Qualifying Precipitation Event	Post-Qualifying Precipitation Event
1	X	X	X	X
2	X	X	X	X
3	X	X	X	X

- III.C.2. Dischargers shall conduct weekly visual inspections to ensure that BMPs are properly installed and maintained. A pre-, during, or post-qualifying precipitation event inspection also satisfies the weekly visual inspection requirement.
- III.C.3. Dischargers shall have a QSP conduct a pre-Qualifying Precipitation Event inspection within 72 hours prior to any weather pattern that is forecasted to have a 50 percent or greater chance of 0.5 inches or more in a 24-hour period. Precipitation forecast information shall be obtained from the [National Weather Service Forecast Office](https://www.weather.gov/) (e.g., by entering the zip code of the project's location at <https://www.weather.gov/>) and shall be included as part of the inspection checklist weather information. If extended forecast precipitation data (greater than three days) is available from the National Weather Service, the pre-precipitation event inspection may be done up to 120 hours in advance. The pre-Qualifying Precipitation Event inspection shall include an inspection of the following:
- All stormwater drainage areas to identify leaks, spills, or uncontrolled pollutant sources and when necessary, implement appropriate corrective actions to control pollutant sources.
 - All BMPs to identify whether they have been properly implemented in accordance with the SWPPP, and when necessary, implement appropriate corrective actions to control pollutant sources.
 - All stormwater storage and containment areas to detect leaks and check for available capacity to prevent overflow.
- III.C.4. Dischargers shall conduct visual inspections at least once every 24-hour period during Qualifying Precipitation Events. Qualifying Precipitation Events are

⁷ This table is limited to routine weekly inspections and Qualifying Precipitation Event related inspections. Other visual inspections may be required under this Permit and are described in the applicable sections.

extended for each subsequent 24-hour period forecast to have at least 0.25 inches of precipitation.

- III.C.5. Dischargers shall conduct post-Qualifying Precipitation Event visual inspections within 96 hours after each Qualifying Precipitation Event if 0.5 inches or more precipitation is measured during the duration of the Qualifying Precipitation Event using the onsite rain gauge. The inspection is to:
 - a. Identify if BMPs were adequately designed, implemented, and effective;
 - b. Identify BMPs that require repair or replacement due to damage; and
 - c. Identify additional BMPs that need to be implemented and revise the SWPPP accordingly.
- III.C.6. Dischargers shall conduct visual inspections during scheduled site operating hours.
- III.C.7. For each required inspection, dischargers shall develop and complete an inspection checklist that, at a minimum includes:
 - a. Inspection type (weekly, pre-precipitation, daily precipitation, or post-precipitation event);
 - b. Inspection date and time the inspection was conducted;
 - c. Weather information, including the presence or absence of precipitation, an estimate of the beginning of the Qualifying Precipitation Event, duration of the event, date of the end of the Qualifying Precipitation Event, and the amount of precipitation in inches;
 - d. Site information, including stage of construction, activities completed since last inspection, and approximate area of the site exposed;
 - e. A description of any BMPs evaluated and any deficiencies noted, including those that may have resulted in the release of non-visible pollutants;
 - f. A list of BMPs inspected, including erosion controls, sediment controls, chemical and waste controls, and non-stormwater controls;
 - g. Report of the presence of any floating and suspended materials, odors, discolorations, visible sheens, and any sources of pollutants in discharges and contained stormwater;
 - h. Any corrective actions required, including any necessary changes to the SWPPP and the associated implementation dates;
 - i. Photographs of areas of concern and the QSP's description of the problem, if any; and
 - j. Inspector's name, title, and certification, if any.

III.D. Water Quality Monitoring Requirements

Dischargers shall collect samples of discharges, based on their Risk Level in accordance with Table 3 and the requirements below, to monitor water quality and

assess compliance with the requirements of this General Permit. Samplers shall be the QSD, QSP, or be trained by the QSP.

Table 3 – Sample Collection Schedule

Risk Level	Stormwater Discharge Sample Collection (as applicable)	Receiving Water Sample Collection (as applicable)	Non-Visible Sample Collection (as applicable)
1	Not Applicable	Not Applicable	X
2	X	Not Applicable	X
3	X	X (Post-exceedance)	X

III.D.1. Risk Level 2 and 3 Stormwater Discharge Monitoring Requirements

- III.D.1.a. Risk Level 2 and 3 dischargers shall collect stormwater grab samples, from all discharge locations incorporating runoff from project construction sites⁸, during discharge and within site operating hours. The grab samples shall be representative of the discharge flow and characteristics.
- III.D.1.b. Risk Level 2 and 3 dischargers shall obtain one sample from each discharge location per 24-hour period of each Qualifying Precipitation Event, during active discharge.
- III.D.1.c. Risk Level 2 and 3 dischargers shall collect samples of stored or contained stormwater during discharge from the impoundment, in accordance with Attachment J.
- III.D.1.d. Risk Level 2 and 3 dischargers shall analyze all samples for:
 - i. pH and turbidity (refer to Order, Section IV.C.3.c and d); and
 - ii. Any additional parameter required by the Regional Water Board.
- III.D.1.e. Risk Level 2 and 3 dischargers may sample run-on from surrounding areas if there is reason to believe run-on may contribute to exceedance of numeric action levels and/or numeric effluent limitations.

III.D.2. Risk Level 3 Receiving Water Monitoring Requirements

- III.D.2.a. Risk Level 3 dischargers who discharge directly into receiving waters are also required to monitor that receiving water if sampling results from the discharge monitoring location meets either of the following conditions:
 - i. pH value falls outside of the range of 6.0 and 9.0 pH units; or
 - ii. Turbidity exceeds 500 NTU.

⁸ The Glossary definition of ‘site’ applies here, i.e., *The area where the construction activity is physically located or conducted, including staging, storage, and access areas.*

- III.D.2.b. Receiving water monitoring does not apply if run-on from a forest fire or any other natural disaster caused the stormwater results to fall outside the pH range or exceed the turbidity value.
- III.D.2.c. Risk Level 3 dischargers required to conduct receiving water monitoring shall collect samples as follows:
 - i. Collect, at minimum, one upstream receiving water sample from an accessible and safe location that is:
 - 1. Representative of the receiving water;
 - 2. As close as possible to the discharge location; and
 - 3. Upstream from the discharge location.
 - ii. Collect, at minimum, one downstream receiving water sample from an accessible and safe location that is:
 - 1. Representative of the receiving water;
 - 2. As close as possible to the discharge location; and
 - 3. Downstream from the discharge location.
- III.D.2.d. Risk Level 3 dischargers shall analyze the samples for the parameter that triggered this monitoring (either pH or turbidity, or both).
- III.D.2.e. Risk Level 3 dischargers shall collect the samples once every 24-hour period of the Qualifying Precipitation Event.
- III.D.2.f. Risk Level 3 dischargers shall specify the specific locations where samples were collected, date and time of sample collection, as well as constituents analyzed.
- III.D.2.g. The Regional Water Board delegate may require, in writing, that the Risk Level 3 discharger continue to sample the receiving water for the parameter that required this monitoring (pH and/or turbidity) after the Qualifying Precipitation Event ends.
- III.D.3. Non-Visible Pollutant Monitoring Requirements
 - III.D.3.a. Dischargers shall implement sampling and analysis requirements to monitor non-visible pollutants when there is:
 - i. Evidence of pollutant releases that are not visually detectable in stormwater discharges; and
 - ii. Releases of substances which could cause or contribute to an exceedance of water quality objectives in the receiving waters.
 - III.D.3.b. Dischargers are required to conduct sampling and analysis for non-visible pollutants identified in the SWPPP or otherwise known to be on site, only when the pollutants may be discharged due to failure to implement BMPs, a container spill or leak, or a BMP breach, failure, or malfunction.

- III.D.3.c. Dischargers shall collect at least one sample, within 8 hours, from each discharge location hydraulically down-gradient from the observed triggering event or condition.
- III.D.3.d. Dischargers shall continue to collect at least one sample per applicable discharge location for each 24-hour period that there is discharge, until the necessary corrective actions are completed to control further discharge of the pollutant.
- III.D.3.e. Dischargers are not required to sample if one of the conditions described in Section III.D.3.b above (e.g., breach or spill) occurs and, prior to discharge, the material containing the pollutant is fully remediated or removed; and BMPs to control the pollutant are implemented, maintained, or replaced as necessary.
- III.D.3.f. Dischargers shall analyze samples in the field or submit them to a laboratory as specified in Section III.F of this Attachment for analysis of all non-visible pollutants suspected to be present in the discharge, including applicable TMDL-specific pollutants listed in Table H-2 in Attachment H.

III.E. Sample Collection and Handling Instructions

III.E.1. Dischargers shall:

- a. Identify applicable parameters that require laboratory analysis for each stormwater discharge location (pH and turbidity are typically analyzed with field meters).
- b. Request the laboratory provide the appropriate number of sample containers, types of containers, sample container labels, blank Chain of Custody forms, and sample preservation instructions.
- c. Use the appropriate sample shipping method to the laboratory. The laboratory should receive samples within 48 hours of the physical sampling (unless otherwise required by the laboratory to meet all method hold times). The options are to either deliver the samples to the laboratory, arrange to have the laboratory pick them up, or ship them overnight to the laboratory.
- d. Use only the sample containers provided/specified by the laboratory to collect and store samples. Use of any other type of containers could cause sample contamination.
- e. Prevent sample contamination by not touching or putting anything into the sample containers before collecting stormwater samples.
- f. Not overfill sample containers. Overfilling can change the analytical results.
- g. Secure each sample container cap without stripping the cap threads.
- h. Label each sample container. The label shall identify the date and time of sample collection, the person taking the sample, and the sample collection location or discharge point. The label should also identify any sample containers that have been preserved.

- i. Carefully pack the sample container into an ice chest or refrigerator to prevent breakage and maintain temperature during shipment; frozen ice packs or ice is placed into the shipping container to keep the sample close to 4° C (39° F) until arriving at the laboratory (do not freeze samples).
 - j. Complete a Chain of Custody form with each set of samples. The Chain of Custody form shall include the discharger's name, address, and phone number, identification of each sample container and sample collection point, person collecting the samples, the date and time each sample container was filled, the analysis that is required for each sample container, and both the signatures of the persons relinquishing and receiving the sample containers.
- III.E.2. The Discharger shall designate and train personnel for the collection, maintenance, and shipment of samples in accordance with the above sample protocols and laboratory-specific practices.
- III.E.3. Dischargers shall perform all sampling and preservation protocols in accordance with the 40 Code of Federal Regulations Part 136 and the current edition of "Standard Methods for the Examination of Water and Wastewater" (American Public Health Association).⁹
- III.E.4. Dischargers may refer to the Surface Water Ambient Monitoring Program's (SWAMP) Quality Assurance Program Plan (QAPrP) for more information on sampling collection and analysis.¹⁰

III.F. Analytical Methods Requirements

- III.F.1. Dischargers shall refer to Table 4 for applicable test methods, detection limits, and reporting units.

⁹ Unless other test procedures have been specified in this General Permit or by the Water Boards.

¹⁰ Additional information regarding the [SWAMP QAPrP](https://www.waterboards.ca.gov/water_issues/programs/swamp/quality_assurance.html#qaprp) can be found at: https://www.waterboards.ca.gov/water_issues/programs/swamp/quality_assurance.html#qaprp. [as of October 20, 2020]

Table 4 - Test Methods, Detection Limits and Reporting Units

Parameter	Test Method	Discharger Type	Method Detection Limit	Reporting Units
pH	Field test with calibrated portable instrument using U.S. EPA approved procedures	Risk Level 2 and 3	0.2	pH units
Turbidity	U.S. EPA 0180.1 and/or field test with calibrated portable instrument	Risk Level 2 and 3	1	NTU
Non-Visible Pollutant Parameter(s)	U.S. EPA-approved test method for the specific pollutant parameter	All Risk Levels	Dependent on the test method	Dependent on the test method

- III.F.2. All monitoring instruments and equipment shall be calibrated and maintained in accordance with manufacturers' specifications to ensure accurate measurements. Additionally, records of calibration shall be retained for at least three years and made available upon request.
- III.F.3. Risk Level 2 and 3 dischargers shall perform pH analysis on-site with a calibrated pH meter using a U.S. EPA acceptable test method.
- III.F.4. Risk Level 2 and 3 dischargers shall perform turbidity analysis using a calibrated turbidity meter (turbidimeter), either on-site or at a State Water Board Environmental Laboratory Accreditation Program (ELAP)-accredited laboratory. Acceptable test methods include Standard Method 2130 B or U.S. EPA Method 180.1.
- III.F.5. All analyses of laboratory-analyzed parameters shall be sent to and conducted at a laboratory recognized by the State Water Board Environmental Laboratory Accreditation Program (ELAP), with the exception of field analysis conducted by the discharger for turbidity and pH.
- III.F.6. All dischargers shall assign a value of zero (0) for all non-visible pollutant analytical results less than the minimum level (reporting limit), as reported by the laboratory, used in calculations required by this permit (e.g., numeric action level and numeric effluent limitation exceedance determinations), so long as a sufficiently sensitive test method was used as evidenced by the reported method detection limit and minimum level.

III.G. Exceedance Response Requirements¹¹

- III.G.1. Dischargers are subject to the applicable numeric action levels and/or numeric effluent limitations based on their Risk Level as shown in Table 5 below.

¹¹ Terms including, but not limited to, numeric action level, numeric effluent limitation, and exceedances are defined in Attachment B of this General Permit.

Table 5 - Numeric Action Levels and Numeric Effluent Limitations

Parameter	Discharger Type	Numeric Action Level	Numeric Effluent Limitation
pH	Risk Level 2 and 3	Lower = 6.5 Upper = 8.5	Not Applicable
Turbidity	Risk Level 2 and 3	250 NTU	Not Applicable
TMDL-related Pollutant	Responsible Dischargers with a project of any Risk Level	Refer to Table H-2 in Attachment H	Refer to Table H-2 in Attachment H

- III.G.2. For pH and turbidity, the discharger shall use the field meter readings obtained from each discharge location per day of discharge to determine if there has been an exceedance of the numeric action levels.
- III.G.3. Whenever analytical results indicate that the discharge is below the lower pH value, above the upper pH value, exceeds the turbidity value, or exceeds an applicable TMDL-related numeric action level or numeric effluent limitation, dischargers shall determine the source(s) of the pollutant and immediately implement corrective actions to:
- Meet Best Available Technology Economically Achievable and Best Conventional Pollutant Control Technology requirements in 40 Code of Federal Regulations §§ 450.21 through 450.23¹²; and
 - Reduce or prevent pollutants in stormwater and authorized non-stormwater discharges from causing further exceedances.
- III.G.4. Dischargers shall iterate corrective actions until the discharge is in compliance with the applicable numeric action level(s).
- III.G.5. The source evaluation shall be kept with the SWPPP and specifically address what corrective actions were taken or will be taken and provide a schedule for their completion.

IV. REPORTING REQUIREMENTS

IV.A. Visual Inspections

Dischargers shall keep all completed inspection checklists and related documentation with the SWPPP on-site or electronically.

12 United States Environmental Protection Agency, [Construction and Development Effluent Limitation Guidelines §§ 450.21 through 450.23](https://www.ecfr.gov/current/title-40/chapter-I/subchapter-N/part-450/subpart-B?toc=1), <<https://www.ecfr.gov/current/title-40/chapter-I/subchapter-N/part-450/subpart-B?toc=1>> [as of June 28, 2022].

IV.B. Water Quality Monitoring

IV.B.1. Risk Level 2 and 3 Stormwater Discharge Monitoring Reporting

- IV.B.1.a. Risk Level 2 and 3 dischargers shall electronically submit through SMARTS all field sampling results within 30 days of the completion of the precipitation event or within 10 days if the field sampling results demonstrate the exceedance of the pH, and/or turbidity numeric action levels.
- IV.B.1.b. Risk Level 2 and 3 dischargers that exceeded the pH and/or turbidity numeric action levels shall prepare a Numeric Action Level Exceedance Report when requested, in writing, from a Regional Water Board delegate and shall submit and certify each Numeric Action Level Exceedance Report through SMARTS within 30 days of receiving the written request, in accordance with Section IV of this General Permit's Order.
- IV.B.1.c. The Numeric Action Level Exceedance Report shall include:
 - i. The analytical method(s), method reporting unit(s), and method detection limit(s) for each parameter;
 - ii. The date, place, time of sampling, visual inspections, and/or measurements, including precipitation; and
 - iii. An assessment of the existing BMPs associated with the sample that exceeded the numeric action level, a description of each corrective action taken including photographs, and date of implementation.
- IV.B.1.d. Risk Level 2 and 3 dischargers that prepared a Numeric Action Level Exceedance Report shall retain a copy of the report for a minimum of three years after the date the exceedance report is certified and submitted.

IV.B.2. Risk Level 3 Receiving Water Monitoring Reporting

- IV.B.2.a. Risk Level 3 dischargers shall electronically submit all receiving water sample results through SMARTS within 10 days of a precipitation event.

IV.B.3. Non-Visible Pollutant Monitoring Reporting

- IV.B.3.a. All dischargers that conducted non-visible pollutant monitoring shall electronically submit through SMARTS all field and/or analytical sampling results within 30 days after obtaining the analytical result or within 10 days after if the analytical results demonstrate the exceedance of an applicable TMDL-related numeric action level or numeric effluent limitation or Basin Plan parameter.
- IV.B.3.b. All dischargers that exceeded an applicable TMDL-related numeric action level shall prepare a Numeric Action Level Exceedance Report when requested, in writing, from a Regional Water Board delegate and shall submit and certify each Numeric Action Level Exceedance Report through SMARTS within 30 days of receiving the written request, in accordance with Section IV of this General Permit's Order.

- IV.B.3.c. The Numeric Action Level Exceedance Report shall include:
- i. The analytical method(s), method reporting unit(s), and method detection limit(s) for each parameter;
 - ii. The date, place, time of sampling, visual inspections, and/or measurements, including precipitation; and
 - iii. An assessment of the existing BMPs associated with the sample that exceeded the numeric action level, a description of each corrective action taken including photographs, and date of implementation.
- IV.B.3.d. All dischargers that prepared a Numeric Action Level Exceedance Report shall retain a copy of the report for a minimum of three years after the date the exceedance report is certified and submitted.
- IV.B.3.e. All dischargers that exceed an applicable TMDL-related numeric effluent limitation shall comply with the water quality-based corrective action requirements in Section VI.Q of the Order.

APPENDIX J

CALTRANS CONSTRUCTION SITE BEST MANAGEMENT PRACTICES (BMPS) MANUAL (APPLICABLE BMPS)



Construction Site Best Management Practices (BMP) Manual

CTSW-RT-17-314.18.1
May 2017

California Department of Transportation
Division of Environmental Analysis, Stormwater Program
1120 N Street
Sacramento, California 95814
<http://www.dot.ca.gov/hg/env/stormwater/index.htm>

For individuals with sensory disabilities, this document is available in alternate formats upon request.

Please call or write to:

Stormwater Liaison, Caltrans Division of Environmental Analysis

MS 27, P.O. Box 942874, Sacramento, CA 94274-0001

(916) 653-8896 Voice or dial 711 to use a relay service.

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CALTRANS Technical Report Documentation Page

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List of Abbreviations

ASBS	Areas of Special Biological Significance	NTU	Nephelometric Turbidity Units
ATS	Active Treatment System	NWS	National Weather Service
BAT	Best Available Technology	OHSD	Office of Hydraulics and Stormwater Design
BCT	Best Conventional Technology	O&M	Operation and Maintenance
BMP	Best Management Practice	PRDs	Permit Registration Documents
Caltrans	State of California, Department of Transportation	QSD	Qualified SWPPP Developer
CASQA	California Stormwater Quality Association	QSP	Qualified SWPPP Practitioner
CEQA	California Environmental Quality Act	RE	Resident Engineer
CCS	Cellular Confinement System	REAP	Rain Event Action Plan
CFR	Code of Federal Regulations	RECP	rolled erosion control products
CGP	Construction General Permit	RW	Receiving Water
CPESC	Certified Professional in Erosion and Sediment Control	RWQCB	Regional Water Quality Control Board
CSBMP	Construction Site Best Management Practices	SDS	Safety Data Sheet
CWA	Clean Water Act	SAP	Sampling and Analysis Plan
DFW	Department of Fish and Wildlife	SMARTS	Storm Water Multiple Application Reporting and Tracking System
DSA	Disturbed Soil Area	SS	Settleable Solids
DTSC	Department of Toxic Substance Control	SSC	Suspended Sediment Concentration
DEA	Division of Environmental Analysis	SSPs	Standard Special Provisions
DWQ	Division of Water Quality	SWMP	Stormwater Management Program
EPA	Environmental Protection Agency	SWPPP	Stormwater Pollution Prevention Plan
ESA	Environmentally Sensitive Area	SWRCB	State Water Resources Control Board
HQ	Headquarters	TMDL	Total Maximum Daily Load
IC/ID	Illegal Connection/Illicit Discharge	TSS	Total Suspended Solids
IH	Information Handout	USACOE	U.S. Army Corps of Engineers
LRP	Legally Responsible Person	USGS	United States Geological Service
LTCGP	Lake Tahoe Hydrologic Unit Construction General Permit	H:V	Horizontal versus Vertical
MEP	Maximum Extent Practicable	WDID	Waste Discharger Identification Number
MS4	Municipal Separate Storm Sewer System	WDR	Waste Discharge Requirement
NAL	Numeric Action Level	WQS	Water Quality Certification
NEL	Numeric Effluent Limitation	WQS	Water Quality Standards
NOAA	National Oceanic and Atmospheric Administration	WPC Manager	Water Pollution Control Manager
NOI	Notice of Intent	WPCD	Water Pollution Control Drawing
NPDES	National Pollutant Discharge Elimination System	WPCP	Water Pollution Control Program
		WPCS	Water Pollution Control Schedule

Section 1

Introduction

1.1 Overview

This Construction Site Best Management Practices (CSBMP) Manual (Manual) provides guidance on the selection and implementation of Best Management Practices (BMPs) into construction projects within the Caltrans right-of-way.

The primary objective of this CSBMP Manual is to provide the overall process for selecting, installing, and maintaining temporary BMPs in Caltrans construction projects. The CSBMP Manual provides a general background of stormwater documents and references to other stormwater manuals, includes a flowchart showing applicable BMP triggers for each of the six Construction Site BMP categories, and detailed guidance for the selection, installation, and required maintenance for individual BMPs. The Manual ties into the Caltrans 2015 Standard Specifications applicable to BMP installation and maintenance frequency,

This Manual is organized as follows:

Section 1 – Introduction

This section provides a background on regulations and stormwater permits, and relevant stormwater guidance documents and websites.

Section 2 – Caltrans Construction Stormwater Program Requirements

provides a description of general documents prepared for or related to the construction phase of the project, instructions for the selection and implementation of Construction Site BMPs and details the minimum BMP inspections required for construction sites.

Section 3 – Temporary Soil Stabilization BMPs

provides an overview of the Soil Stabilization BMP category and a listing and working details for Caltrans Construction Site BMPs for Temporary Soil Stabilization.

Section 4 – Temporary Sediment Control BMPs

provides an overview of the Sediment Control BMP category and a listing and working details for Caltrans Construction Site BMPs for Temporary Sediment Control.

Section 5 - Wind Erosion Control BMPs

provides an overview of the Wind Erosion BMP category and a listing and working details for Caltrans Construction Site BMPs for Wind Erosion Control.

Section 6 - Tracking Control BMPs

provides an overview of the Tracking Control BMP category and a listing and working details for Caltrans Construction Site BMPs for Tracking Control.

Section 7 - Non-Stormwater Management BMPs

provides an overview of the Non- Stormwater Management BMP category and a listing and working details for Caltrans Construction Site BMPs for Non-Stormwater Management.

Section 8 - Waste Management and Material Pollution Control BMPs

provides an overview of the Waste Management and Materials Pollution Control BMP category and a listing and working details for Caltrans Construction Site BMPs for Waste Management and Materials Pollution Control.

Appendix A - provides definitions of terms used throughout this Manual.

Appendix B - provides guidance on the selection of temporary soil stabilization controls.

Appendix C - provides guidance on the requirements for the implementation of Active Treatment System (ATS) to comply with the CGP or the LTCGP.

1.2 Regulations and Stormwater Permits

Federal Regulations

The Clean Water Act is a Federal regulation that deals in part with controlling discharges of pollutants from Municipal Separate Storm Sewer Systems (MS4s), construction sites, and industrial activities as part of the National Pollutant Discharge Elimination System (NPDES) permit process. In 1990, the Environmental Protection Agency (EPA) promulgated federal stormwater regulations requiring municipal, construction and industrial stormwater discharges to comply with an NPDES permit.

In California, the EPA delegated its authority to issue NPDES permits to the State Water Resources Control Board (SWRCB). The State Board has nine regional water quality control boards across the State. Figure 1-1 presents a depiction of the nine regional board boundaries in relation to the Caltrans Districts.

Caltrans NPDES Statewide Permit and NPDES Construction General Permits

On July 15, 1999, the SWRCB issued the first “NPDES Permit, Statewide Stormwater Permit and Waste Discharge Requirements (WDRs) for the State of California, Department of Transportation (Caltrans)” (NPDES No. CAS000003) hereby called “Caltrans Permit.” The Caltrans Permit requires the preparation and implementation of the Caltrans Statewide Stormwater Management Plan (SWMP). The SWMP describes how Caltrans plans to implement the Caltrans Permit requirements and describes Caltrans’ program addressing stormwater pollution control related to various activities, including planning, design, construction, maintenance, and operation of roadways and facilities.

The Caltrans Permit regulates stormwater discharges from Caltrans properties, facilities, and activities, and requires that Caltrans’ construction program comply with the requirements of the “NPDES General Permit, WDRs for Discharges of Stormwater Runoff Associated with Construction Activity” (NPDES No. CAS000002) (Construction General Permit) issued by the SWRCB.

Both the Caltrans Permit and the Construction General Permit (CGP) have been reissued since 2009. The current Caltrans Permit Order 2012-0011-DWQ became effective July 1, 2013 and requires construction projects with one acre or more of soil disturbance to comply with the CGP Order 2009-009-DWQ and amendments thereto. There are a small number of Caltrans projects that are situated in the Lake Tahoe Regional Board area; those projects are subject to the Lake Tahoe Construction General Permit (LTCGP) Order No.R6T-1016-0010. The CGP and the LTCGP require SWPPP projects to upload the authorized SWPPP and all other relevant documents and data to the State Board’s Stormwater Multiple Application and Report Tracking System (SMARTS).

Other NPDES Permits

There are other Permits that might be applicable to Caltrans construction projects depending on the specific activities. Any construction project might trigger the Statewide Industrial Permit coverage if there is a proposed batch plant or other industrial activities as outlined below. In addition, if there is any dewatering being proposed, there are specific Regional Permits that might be applicable.

Industrial Permit

Industrial Activities are not covered under the Caltrans Permit. The Statewide Permit for Stormwater Discharges Associated with Industrial Activities (IGP) (Order 2014-0057-DWQ) regulates nine broad categories of industrial activities. There are certain activities that might occur ancillary to construction projects; for those operations, the industrial permit is triggered. Caltrans contracts include language requiring the Contractor to implement BMPs and seek coverage as required under the IGP.

Dewatering Permit

Dewatering discharge requirements vary among the nine regional boards. Caltrans has developed a Dewatering Manual that should be referred to determine appropriate requirements for the individual construction site. The Dewatering Manual can be accessed via the website link included in Table 1-4.

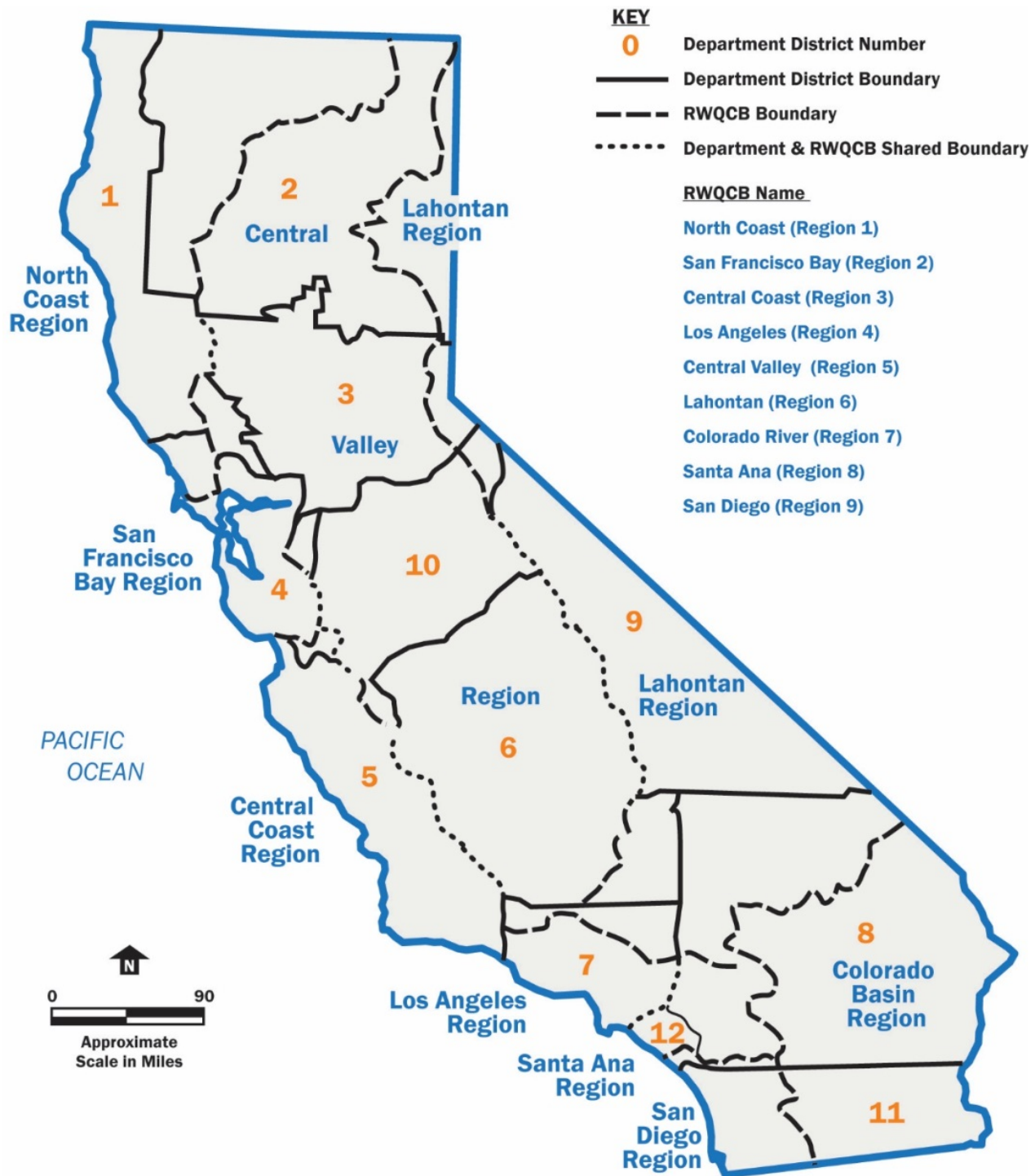


Figure 1-1. Map of California with Regional Water Quality Control Boards and Caltrans Districts

1.3 Caltrans Stormwater Manuals and Websites

Caltrans has devised a comprehensive stormwater program to comply with Caltrans Permit requirements. In addition to the 2016 SWMP, Caltrans has developed several stormwater guidance manuals that are available on their website for staff, consultants and anyone in the public to use to implement appropriate BMPs.

Table 1-3 presents a list of the primary reference material to be used for determining applicable permit requirements and specific compliance mechanisms developed by Caltrans. This Manual is intended to be used in conjunction with the SWPPP/WPCP Preparation Manual as both are directly related to water pollution control when performing construction operations within Caltrans projects and/or rights of way.

Table 1-3. Relevant Caltrans Stormwater Documents, Manuals and their Purpose ¹		
Date	Document	Purpose
July 2016	Caltrans Stormwater Management Plan (SWMP)	Describes how Caltrans plans to implement the Caltrans Permit requirements. The SWMP describes Caltrans' program and addresses stormwater pollution control related to various activities, including planning, design, construction, maintenance, and operation of roadways and facilities.
February 2016	Stormwater Quality Handbooks: Project Planning and Design Guide (PPDG)	Guides project planning staff in preparing and selecting appropriate Best Management Practices for inclusion into Contract Plans. Includes step-by-step guidance for documenting the selection and implementation of BMPs.
	Appendix E - Stormwater Data Report (SWDR)	Document prepared by the Project Engineer or Landscape Architect which forms basis for ensuring compliance with the Caltrans Permit requirements for the Design Division. Determination of SWPPP/WPCP applicability based on DSA and BMP line items included as part of the Contract Plans.
June 2016	Stormwater Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP) Preparation Manual	Guides Contractors and Caltrans staff through the process of preparing a SWPPP and WPCP. This manual provides detailed step-by-step procedures, instructions, sample text and a template that Contractors must use to prepare the SWPPP/WPCP. Templates conform to CGP requirements based on risk level, LTCGP requirements including deviations from CGP language, and Caltrans requirements for preparing WPCPs.
August 2013	Construction Site Monitoring Program Guidance Manual	This manual presents guidance for Caltrans staff and Contractors to use in the planning and implementation of stormwater monitoring programs at construction sites. Describes and provides guidance on developing Sampling and Analysis Plans, standard operating procedures for pH and turbidity sampling and other requirements of the CGP and LTCGP.
July 2003	Guidance for Temporary Soil Stabilization	The main purpose of this document is to help direct the planning, selection, and implementation of Caltrans-approved temporary soil stabilization BMPs.
July 2014	Field Guide to Construction Site Dewatering	The purpose of this Dewatering Guide is to inform and guide intended users in selecting, implementing, and monitoring construction site dewatering operations.
September 2008	Erosion Prediction Procedure Manual	Describes the method established and approved by headquarters (HQ) Office of Hydraulics and Stormwater Design (OHSD) for the prediction of erosion rates before, during, and after construction of Caltrans projects to meet the erosion and sediment control requirements identified in the Caltrans Permit, the CGP and the LTCGP.

Table 1-4 presents website links for Caltrans Manuals, procedures and other documents along with other websites that can be used to either gain a deeper understanding of stormwater requirements or as

¹ There may be other relevant Manuals that pertain to specific enforcement or general criteria, see Table 1-4 for additional Manuals and links

guidance when preparing stormwater documents and selecting appropriate temporary construction site BMPs.

Table 1-4. Stormwater Related Websites

	Description	Websites
EPA Agency	U.S. Environmental Protection Agency (EPA)	http://www.epa.gov
Laws/ Regulations	Code of Federal Regulations (CFR)	http://www.gpo.gov/fdsys/browse/collectionCfr.action?collectionCode=CFR
NPDES Permits	Caltrans NPDES Statewide Stormwater Permit (Caltrans Permit)	http://www.swrcb.ca.gov/water_issues/programs/stormwater/caltrans.shtml
	Construction General Permit (CGP)	http://www.swrcb.ca.gov/water_issues/programs/stormwater/construction.shtml
	Lake Tahoe Construction General Permit (LTCGP)	http://www.waterboards.ca.gov/lahtontan/water_issues/programs/storm_water/docs/r6t_2016_0010_cgp_combined.pdf
	Industrial General Permit (IGP)	http://www.swrcb.ca.gov/water_issues/programs/stormwater/industrial.shtml
Caltrans Stormwater Program	Caltrans Statewide Stormwater Program – HQ DEA (contains links such as SWMP, Annual Report)	http://www.dot.ca.gov/hq/env/stormwater/index.htm
State Water Resources Control Board	State Water Resources Control Board website, particularly Stormwater Multiple Application and Report Tracking System (SMARTS)	https://smarts.waterboards.ca.gov/smarts/faces/SwSmartsLogin.xhtml
Caltrans Stormwater Manuals	Division of Construction - Stormwater Quality Link. Contains links to resources for developing SWPPP, WPCP, Construction Site Dewatering and other Manuals and resources.	http://www.dot.ca.gov/hq/construc/stormwater/
	Caltrans Construction Stormwater Quality Manuals and Handbooks	http://www.dot.ca.gov/hq/construc/stormwater/manuals.htm
Caltrans SSP and Stormwater Costs Estimating Guidance	Caltrans Construction Contract Standards Specifications, Plans, Standard Special Provisions (SSPs) ²	http://www.dot.ca.gov/hq/esc/oe/specs_html/index.html
	Caltrans Cost estimating guidance	http://www.dot.ca.gov/hq/oppd/costest/costest.htm

² Contract Documents could include specific project requirements such as specific monitoring requirements under CWA 401 or 404 Permit or others included in the Informational Handout.

Section 2

Caltrans Construction Stormwater Management Program Requirements

2.1 Stormwater Pollution Prevention Plan and Water Pollution Control Program

Caltrans requires Contractors to prepare and implement a program to effectively control water pollution during the construction of all projects (see Standard Specification Section 13 Water Pollution Control). Projects resulting in one acre or more of disturbed soil area (DSA) are subject to the CGP or the LTCGP depending on the project location. Caltrans Standard Specifications require that for these projects, Contractors prepare and submit a SWPPP.

If two or more small projects [less than one acre of soil disturbance] in the same corridor are part of a larger common plan of development [one acre or more], then these small projects are also subject to the requirements of the CGP or the LTCGP to develop and implement a SWPPP. There also might be instances where a SWPPP is required even when there is less than one acre of DSA, if it is determined that the project poses a significant water quality risk; this determination will be made by the District/Regional NPDES Coordinator or the Construction Stormwater Coordinator or if mandated by the RWQCB or SWRCB or another regulatory agency. Potential examples when this might occur could be work over a 303d waterbody, water implosions, etc.

Caltrans requires that a WPCP addressing control measures be prepared and implemented by the construction Contractor for projects resulting in soil disturbance of less than one acre. The specific requirements and detailed instructions are included in Section 4 of the SWPPP/WPCP Preparation Manual. These general requirements are included in the Construction BMP Applicability Flowchart, Figure 2-1 of this Manual.

Projects that have a DSA between one and less than five acres may qualify for a rainfall erosivity waiver under the CGP if the rainfall erosivity factor (R factor) is less than a value of five. The R factor takes into account project location, length of construction period, and time of year so projects that begin and complete construction within a short period are likely to qualify for a rainfall erosivity waiver. To calculate the R value, refer to Section 1.4.2.1 of the SWPPP/WPCP Preparation Manual, a link to the manual is provided in Table 1-4.

Projects that qualify for a rainfall erosivity waiver do not need to prepare a SWPPP but are required to submit proper documentation via SMARTS (to be exempted from the CGP) as well as prepare and implement a site-specific Water Pollution Control Program (WPCP).

2.2 Construction BMP Applicability

The flowchart presented in Figure 2-1 guides the user as to whether the project triggers a SWPPP or a WPCP and where to find additional information, if needed. The flowchart also includes general questions to determine applicability of BMP categories that are described in Sections 3-8 of this Manual.

The steps described below correspond to the steps shown in Figure 2-1.

Step 1 - Start

The Contractor, the Water Pollution Control (WPC) Manager, the Qualified SWPPP Developer (QSD) or the Qualified SWPPP Practitioner (QSP) should use Figure 2-1, the guidance provided in this section, and the SWPPP/WPCP Preparation Manual to determine the project's entire BMP selection and applicability for the duration of the construction phase.

Step 2 - Is a Construction project being proposed?

A construction project is defined as any activity, including, but not limited to, clearing, grading, grubbing, or excavation. Routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of the facility is not deemed a construction activity that requires a SWPPP or a WPCP.

If the project qualifies as a construction project, proceed to step 3.

If the project does not meet the definition of construction, then the project is subject to Maintenance BMPs, refer to the Caltrans July 2016 SWMP or the Caltrans Maintenance Staff Guide.

Step 3 - Will the project create one acre or more of Disturbed Soil Area?

If the construction project will disturb more than one acre of soil, it is subject to either the CGP or the LTCGP depending on its location and must prepare and maintain an up to date SWPPP during the entire duration of the project.

If the project disturbs less than an acre of soil, the project must have a WPCP prepared and implemented, see Section 4 of the SWPPP/WPCP Preparation Manual for specific instructions.

Step 4 - Can the construction project qualify for a Rainfall Erosivity Waiver?

If a project will be a short duration and is more than one acre but less than five acres of soil disturbance, it might qualify for an EPA rainfall erosivity waiver as discussed in Section 1.4.2 of the SWPPP/WPCP Preparation Manual.

If you answered yes, the project does not need coverage under the CGP but it still requires some paperwork to be filed via SMARTS. In addition, a WPCP must be prepared and implemented.

If you answered no, then project is subject to SWPPP requirements. See Section 3 of the SWPPP/WPCP Preparation Manual for further guidance on preparing a SWPPP.

Step 5 - Are any soil areas expected to be exposed and need stabilization as part of the project or is there a need to stabilize concentrated flow conveyances?

Any project subject to CGP or LTCGP is required to implement appropriate controls year-round. If the project has exposed soil areas or unlined conveyances, the WPC Manager or QSP must be diligent in ensuring appropriate BMPs are implemented. See Section 3 of this Manual for specific BMP factsheets and proceed to Step 6. For further guidance on proper selection and costs, see Appendix B of this Manual.

If there are no soil areas needing stabilization and no unstable conveyances, then proceed to Step 6.

Step 6 - Will the project require temporary controls to intercept/slowdown onsite or offsite flows?

If the project has areas where offsite flows are coming onto the project area, flows must be conveyed and the WPC Manager or QSP must ensure that no materials or contaminants including soil are being carried by the offsite flows. Onsite flows must be conveyed via lined or vegetated channels to reduce potential for turbid flows. See Section 4 of this Manual for specific BMP factsheets to control sediment-laden runoff.

Step 7 - Will the project require a dust control plan or is there a potential for dust control BMPs to be applicable?

Utilize Section 5 of this Manual for specific BMP factsheets if the contract documents require the preparation and implementation of a Dust Control Plan or if there is a potential for dust to be generated at any time during the duration of the construction project.

Step 8 - Will the project require tracking controls in any area within project limits?

Any areas where construction vehicles are entering or exiting the project must be stabilized to prevent tracking of sediment or other materials. See Section 6 of this Manual for specific BMP factsheets for tracking control. Additionally, SC-7, Street Sweeping should be evaluated and implemented either standalone or in combination to ensure compliance with all permits and contract documents.

Step 9 - Will the project day to day operations require good housekeeping practices or have a need for non-stormwater BMPs?

Section 7 of this Manual includes a list of source control BMPs that prevent pollution by limiting or reducing potential pollutants at their source before they come in contact with stormwater.

Step 10 - Will the project include storage of materials, spill prevention needs, waste management or other housekeeping practices?

All materials or wastes either stored or generated during the construction phase must be properly stored and disposed of. Section 8 of this Manual includes lists of BMPs that must be utilized at the Contractor's yard, where the materials are stored, or where construction activities are being conducted to ensure proper usage, containment, and disposal of materials and waste products.

END - Specific BMP factsheets should be reviewed and the Project's SWPPP or WPCP text and tables along with the Water Pollution Control Drawings (WPCDs) should be modified to ensure appropriate controls are implemented year-round

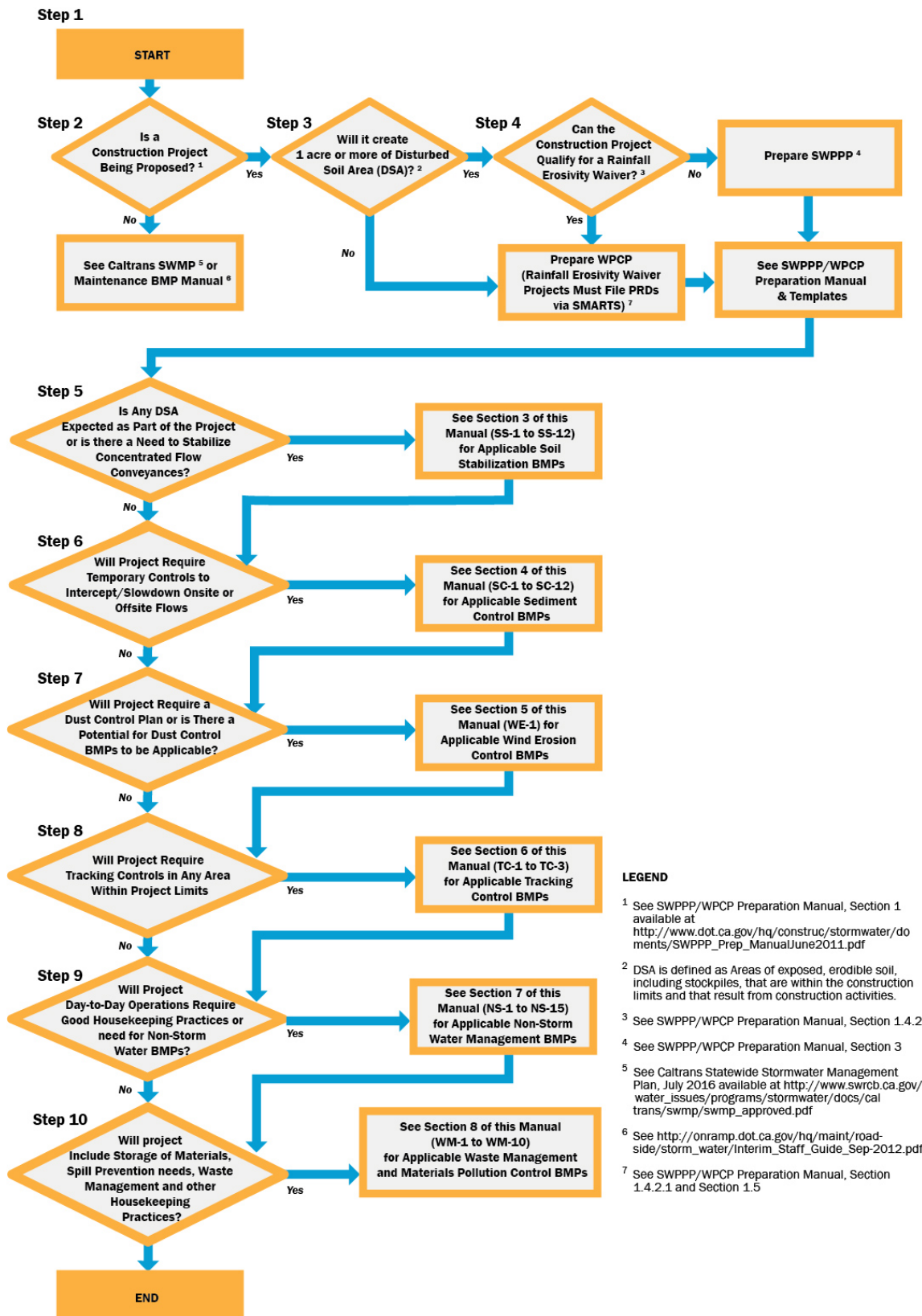


Figure 2-2. Construction Site BMP Applicability Flowchart

2.3 Minimum Construction BMPs

This section provides the minimum construction BMPs required for a project subject to the CGP or the LTCGP or one that requires the preparation and implementation of a WPCP. It is important to note that the requirements of this Section are minimum requirements, and that Caltrans contracts may impose more stringent requirements. Working details of Construction Site BMPs are presented in Sections 3 through 8 of this Manual.

Construction Site BMPs (also sometimes called temporary control practices or BMPs) are best conventional technology/best available technology (BCT/BAT)-based BMPs that are consistent with the BMPs and control practices required under the CGP and the LTCGP. Caltrans Construction Site BMPs are divided into six categories as shown in Table 2-1.

Stormwater pollution control requirements are intended to be implemented on a year-round basis at an appropriate level. The requirements must be implemented in a proactive manner during all seasons while construction is ongoing. Appropriate water pollution control includes the implementation of an effective combination of both soil stabilization and sediment controls, implementation of wind erosion, tracking controls, non-stormwater and waste management, and material pollution BMPs. Some BMPs can be implemented as a stand-alone device while others can be combined to improve effectiveness and compliance.

Section 2 of the SWPPP/WPCP Preparation Manual describes in detail specific requirements under the applicable CGP. The CGP and LTCGP both require minimum controls and require BMPs based on the projects' calculated risk level to apply linear sediment controls along the toe of the slope, face of the slope, and at the grade breaks of exposed slopes to comply with sheet flow lengths.

Table 2-1. Construction Site BMPs			
ID	BMP Name	Minimum Requirement	
		CGP	LTCGP
Temporary Soil Stabilization			
SS-1	Scheduling	X	X
SS-2	Preservation of Existing Vegetation	X	X
SS-3	Hydraulic Mulch	X ¹	X ¹
SS-4	Hydroseeding		
SS-5	Soil Binders		
SS-6	Straw Mulch		
SS-7	Temporary Cover and Rolled Erosion Control Products (RECP)		
SS-8	Wood Mulching		
SS-9	Earth Dikes/Drainage Swales & Lined Ditches	-	-
SS-10	Outlet Protection/Velocity Dissipation Devices ²	X	X
SS-11	Slope Drains	-	-
SS-12	Streambank Stabilization	-	-
Temporary Sediment Control			
SC-1	Silt Fence	X ¹	X ¹
SC-2	Sediment/Desilting Basin	-	-

Table 2-1. Construction Site BMPs

ID	BMP Name	Minimum Requirement	
		CGP	LTCGP
SC-3	Sediment Trap/Curb Cutback	-	-
SC-4	Check Dam	-	-
SC-5	Fiber Rolls	X ¹	X ¹
SC-6	Gravel Bag/Earthen Berm		
SC-7	Street Sweeping	X	-
SC-8	Sandbag Barrier	X	X
SC-9	Straw Bale Barrier	X ¹	X ¹
SC-10	Temporary Drainage Inlet Protection	X	X
SC-11	Compost Sock	X ¹	X ¹
SC-12	Flexible Sediment Barrier		
Wind Erosion Control			
WE-1	Wind Erosion Control	X	X
Tracking Control			
TC-1	Temporary Construction Entrance/Exit	X	X
TC-2	Temporary Construction Roadway	-	-
TC-3	Temporary Entrance/Outlet Tire Wash	-	-
Non-Stormwater Management			
NS-1	Water Conservation Practices	-	-
NS-2	Dewatering Operations	-	X ³
NS-3	Paving, Sealing, Sawcutting and Grinding Operations	X	X
NS-4	Temporary Stream Crossing	-	-
NS-5	Clear Water Diversion	-	-
NS-6	Illegal Connection and Illicit Discharge Detection and Reporting	X	X
NS-7	Potable Water/Irrigation	-	-
NS-8	Vehicle and Equipment Cleaning	X	X
NS-9	Vehicle and Equipment Fueling	X	X
NS-10	Vehicle and Equipment Maintenance	X	X
NS-11	Pile Driving Operations	-	-
NS-12	Concrete Curing	-	-
NS-13	Material and Equipment Use Over Water	-	-
NS-14	Concrete Finishing	-	-
NS-15	Structure Demolition/Removal Over or Adjacent to Water	-	-

Table 2-1. Construction Site BMPs			
ID	BMP Name	Minimum Requirement	
		CGP	LTCGP
Waste Management and Materials Pollution Control			
WM-1	Material Delivery and Storage	X	X
WM-2	Material Use	X	X
WM-3	Stockpile Management	X	X
WM-4	Spill Prevention and Control	X	X
WM-5	Solid Waste Management	X	X
WM-6	Hazardous Waste Management	X	X
WM-7	Contaminated Soil Management	X	X
WM-8	Concrete Waste Management	X	X
WM-9	Sanitary and Septic Waste Management	X	X
WM-10	Liquid Waste Management	X	X

¹ Can be selected as a standalone BMP or a combination of temporary soil stabilization BMPs is selected depending on site conditions, minimum requirement is met when the individual BMP or the combination is properly implemented.

² Only applicable when outlet protection/velocity dissipation is required.

³ When dewatering is expected, must have a dewatering and/or diversion plan as required under LTCGP Section N.

2.4 BMP Inspection Frequency

The SWPPP or WPCP implemented on Caltrans construction projects includes specific visual monitoring requirements to comply with the CGP, LTCGP, and/or Caltrans Permit. All BMPs deployed on construction sites must be inspected on a frequency as described below. Improperly installed or damaged BMPs must be corrected immediately, or by a later date and time if requested by the Contractor and approved by the Resident Engineer (RE) in writing. Corrections must be made before the onset of forecasted rain events. Inspections of Construction Site BMPs are to be conducted at a minimum as follows:

- Prior to a forecast storm event
- After a qualified rain event that causes runoff from the construction site
- At 24-hour intervals during extended rain events
- Weekly throughout the duration of the construction project

Table 2-2 shows the monitoring requirements for projects subject to CGP or LTCGP. The SWPPP/WPCP Preparation Manual includes more details on what each inspection should include.

Table 2-2. Monitoring Requirements for CGP and LTCGP

Risk Level		Visual Inspections					Sampling		
		Quarterly Non-stormwater Discharge	Pre-Storm			Post Storm			
			Baseline	REAP	Daily Storm BMP	Post Storm	Non-visible Pollutant	Stormwater Discharge	Receiving Water
CGP	1	X	X		X	X	X		
	2	X	X	X	X	X	X	X	
	3	X	X	X	X	X	X	X	X
LTCGP	N/A	X	X	X	X	X	X	X	X

Section 3

Temporary Soil Stabilization BMP

3.1 Temporary Soil Stabilization

Temporary soil stabilization consists of preparing the soil surface and applying one of the BMPs shown in Table 3-1, or combination thereof, to disturbed soil areas. Temporary soil stabilization must be applied to disturbed soil areas of construction projects in conformance with contract documents and this Manual. Refer to Appendix B for additional guidance on the selection of temporary soil stabilization controls.

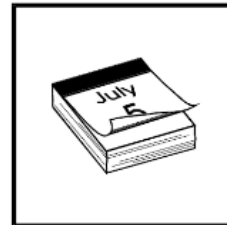
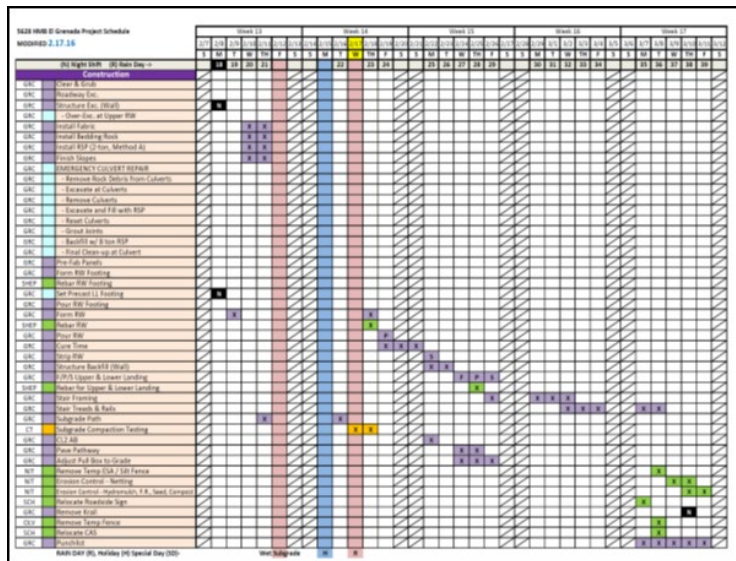
3.2 Temporary Concentrated Flow Conveyance Controls

Temporary concentrated flow conveyance controls consist of a system of measures or BMPs that are used alone or in combination to intercept, divert, convey and discharge concentrated flows with a minimum of soil erosion, both on-site and downstream (off-site). Temporary concentrated flow conveyance controls may be required to direct run-on around or through the project in a non-erodible fashion. Temporary concentrated flow conveyance controls include the following BMPs:

- Earth Dikes/Drainage Swales & Lined Ditches
- Outlet Protection/Velocity Dissipation Devices
- Slope Drains

Table 3-1. Temporary Soil Stabilization BMPs	
ID	BMP Name
SS-1	Scheduling
SS-2	Preservation of Existing Vegetation
SS-3	Hydraulic Mulch
SS-4	Hydroseeding
SS-5	Soil Binders
SS-6	Straw Mulch
SS-7	Temporary Cover and Rolled Erosion Control Products (RECP)
SS-8	Wood Mulching
Temporary Concentrated Flow Conveyance Controls	
SS-9	Earth Dikes/Drainage Swales & Lined Ditches
SS-10	Outlet Protection/Velocity Dissipation Devices
SS-11	Slope Drains
SS-12	Streambank Stabilization

The remainder of this section shows the working details for each of the BMPs.



Standard Symbol

BMP Objectives	
Soil Stabilization	☒
Sediment Control	☒
Tracking Control	☒
Wind Erosion Control	☒
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

This BMP involves developing, for every project, a schedule that includes sequencing of construction activities with the implementation of construction site BMPs such as temporary soil stabilization and temporary sediment control measures. The purpose is to reduce the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking, and to perform the construction activities and control practices in accordance with the planned schedule.

Appropriate Applications

Construction sequencing should be scheduled to minimize land disturbance during the wetter months for all projects. In addition, any construction windows required by regulatory permits, and any winter suspension work should be described in the schedule. Appropriate BMPs must be implemented year-round.

Limitations

Environmental constraints such as nesting season prohibitions reduce the full capabilities of this BMP.

Standards and Specifications

General Requirements

Developing a schedule and planning the project operations to minimize erosion and the potential to discharge pollutants to stormwater are the very first steps in an effective stormwater program. The construction schedule must be incorporated into the SWPPP or WPCP. Refer to Section 8 and 13 of the Standard Specifications.

The schedule should clearly show when work activities that could pollute stormwater with sediment or other contaminants would occur (e.g., grading, move-in, move-out, stockpiling, pile driving), and when soil stabilization, sediment control, and other BMPs associated with each phase of construction would be implemented.

The schedule should include details on the implementation and deployment of:

- Temporary and permanent soil stabilization BMPs
- Temporary sediment control BMPs
- Tracking control BMPs
- Wind erosion control BMPs
- Non-stormwater BMPs, and
- Waste management and materials pollution control BMPs

The schedule should also include dates for significant long-term operations or activities that may have planned non-stormwater discharges such as dewatering, sawcutting, grinding, drilling, boring, crushing, blasting, painting, hydro-demolition, mortar mixing, bridge cleaning, etc.

The construction schedule should reflect requirements for in-water work and other construction activity with potential to disturb water and biological resources contained in regulatory agency permits and approvals (RWQCB 401 WQC, USACE 404 permit, DFG 1602 permit, etc.).

Recommendations

Schedule work to minimize soil disturbing activities during predicted rain events. Consider rescheduling activities for dry periods to minimize maintenance requirements.

Develop the sequencing and timetable for the start and completion of each item such as site clearing and grubbing, grading, excavation, paving, pouring foundations, installing utilities, etc., to minimize the active construction area.

Schedule major grading operations during dryer months when practical.

Stabilize inactive areas within 15 days from the cessation of soil-disturbing activities or one day prior to the onset of precipitation, whichever occurs first. Must consider manufacturers recommendation for the selected soil stabilization BMP to ensure they meet the minimum dry time required. See Appendix B of this Manual for additional guidance.

Monitor the weather forecast for storm events, which are storms that produce or are forecasted to produce at least 0.1 inch of precipitation within a 24-hour period. When rainfall is predicted, adjust the construction schedule to allow the implementation of soil stabilization, sediment controls, and, if applicable, sediment treatment controls on all disturbed areas prior to the onset of rain.

Ensure ample supply of BMP materials are on site in order to quickly mobilize and implement required BMPs, particularly ahead of rain events when materials may be in short supply or back order.

Be prepared year-round to deploy soil stabilization and sediment control practices. Erosion may be caused during dry seasons by unseasonal rainfall, wind, and vehicle tracking. Keep the site stabilized year-round, and retain and maintain sediment trapping devices in operational condition.

Sequence trenching activities so that most open portions are closed before new trenching begins. Trenched material should be stored on the upstream side of the trenches.

Incorporate staged seeding and re-vegetation of graded slopes as work progresses.

Consider the early planting and establishment of permanent vegetation in the schedule to maximize plant establishment success and minimize irrigation and continuous maintenance needs.

Apply permanent erosion control to areas deemed substantially complete during the project's defined seeding window.

Maintenance and Inspection

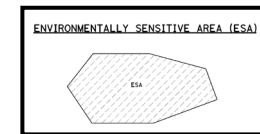
Verify that work is progressing in accordance with the schedule. If progress deviates, take corrective actions.

Keep the schedule up to date and ensure it is consistent with the contractor's three-week look ahead, or other routine schedule submitted to the RE under the contract.

Amend the schedule when changes are warranted or when directed by the RE.

SWPPP or WPCP

A Water Pollution Control Schedule (WPCS) must include construction operations and BMP implementation for the entire duration of the project. The WPCS is to be included as an attachment and discussed in section 500.7 of the SWPPP or Section 30.5 of the WPCP.



Standard Symbol

BMP Objectives	
Soil Stabilization	☒
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

Preservation of existing vegetation is the identification and protection of desirable vegetation that provides erosion and sediment control benefits.

Appropriate Applications

Preserve existing vegetation at areas on a site where no construction activity is planned or will occur at a later date. This BMP is very applicable for multi-year or multiple location projects, where existing vegetation can be preserved until the area becomes active.

On a year-round basis, temporary fencing shall be provided prior to the commencement of clearing and grubbing operations or other soil-disturbing activities in areas.

Clearing and grubbing operations should be staged to preserve existing vegetation.

Areas where natural vegetation exists and is designated for preservation. Such areas often include steep slopes, watercourse, and building sites in wooded areas.

Areas where local, state, and federal government require preservation, such as vernal pools, wetlands, marshes, certain oak trees, etc.

Clearly marking and leaving a buffer area around these unique areas during construction will help to preserve these areas as well as take advantage of natural erosion prevention and sediment trapping.

During clearing and grubbing do not injure standing trees, plants, and improvements shown in the plans to be protected.

For any trenching or tunneling. Trenching shall be as far away from tree trunks as possible, usually outside of the tree drip line or canopy. Curve trenches around trees to avoid large roots or root concentrations. If roots are encountered, consider tunneling under them.

When trenching and/or tunneling near or under trees to be retained, tunnels shall be at least 8 in below the ground surface, and not below the tree center to minimize impact on the roots. Tree roots shall not be left exposed to air; they shall be covered with soil as soon as possible, protected, and kept moistened with wet burlap or peat moss until the tunnel and/or trench can be completed.

Limitations

Protection of existing vegetation requires planning, and may limit the area available for construction activities.

For sites with diverse topography, it is often difficult and expensive to save existing trees while grading the site satisfactory for the construction project.

Standards and Specifications

General Requirements

Specifications for preservation of existing vegetation can be found in Standard Specifications Section 5-1.36A.

Section 14 “Environmental Stewardship” of the Standard Specifications specifies the requirements related to environmental compliance and resource management, including requirements related to Environmentally Sensitive Areas (ESAs).

Refer to Section 16-2.03 of the Standard Specifications for “High-Visibility Fences” used to delineate ESAs.

Refer to 16-2.04 of the Standard Specifications for “Temporary Construction Mats” used to protect wetlands and other areas.

Schedule

Preservation of existing vegetation must be provided prior to the commencement of clearing and grubbing operations or other soil-disturbing activities in areas identified on the plans to be preserved, including areas designated as ESAs.

Preservation of existing vegetation should conform to scheduling requirements set forth in the special provisions.

Design and Layout

Mark areas to be preserved with temporary fencing (Type ESA). The temporary fencing must be made of high visibility fabric secured with 6 foot (minimum) posts. Refer to Section 16-2.03B of the Standard Specifications for more information on temporary high-visibility fence materials.

Fence posts can be either wood or steel, at the Contractor’s discretion, as appropriate for the intended purpose. The post spacing must be 8 feet center-to-center (maximum) and embedded at least 16 inches into the ground to completely support the fence in an upright position.

See Standard Plan T65 for “Temporary Fence (Type ESA).”

Installation

Construction materials, equipment storage, and parking areas should be located where they will not cause damage to vegetation designated for preservation. This could include: keeping equipment away from trees to prevent trunk and root damage, considering the impact of grade changes to existing vegetation and the root zone, and minimizing disturbed areas by avoiding stands of trees and shrubs and following existing contours to reduce cutting and filling for temporary roads.

Maintain existing irrigation systems.

Employees and subcontractors must be instructed to honor protective devices. No heavy equipment, vehicular traffic, or storage piles of any construction materials is permitted within the drip line of any tree to be retained. Removed trees should not be felled, pushed, or pulled into any retained trees. Fires should not be permitted within 100 ft of the drip line of any retained trees. Any fires must be of limited size, and must be kept under continual surveillance. No toxic or construction materials (including paint, acid, nails, gypsum board, chemicals, fuels, and lubricants) should be stored within 50 feet of the drip line of any retained trees, nor disposed of in any way which would injure vegetation.

After all other work is complete, fences and barriers must be removed last. This is because protected trees may be destroyed by carelessness during the final cleanup and landscaping.

Maintenance and Inspection

During the entire construction phase, the limits of disturbance must remain clearly marked to avoid damage to the existing vegetation during site cleanup and stabilization. Irrigation or maintenance of existing vegetation must conform to the requirements in the landscaping plan. If damage to protected trees still occurs, maintenance guidelines described below must be followed:

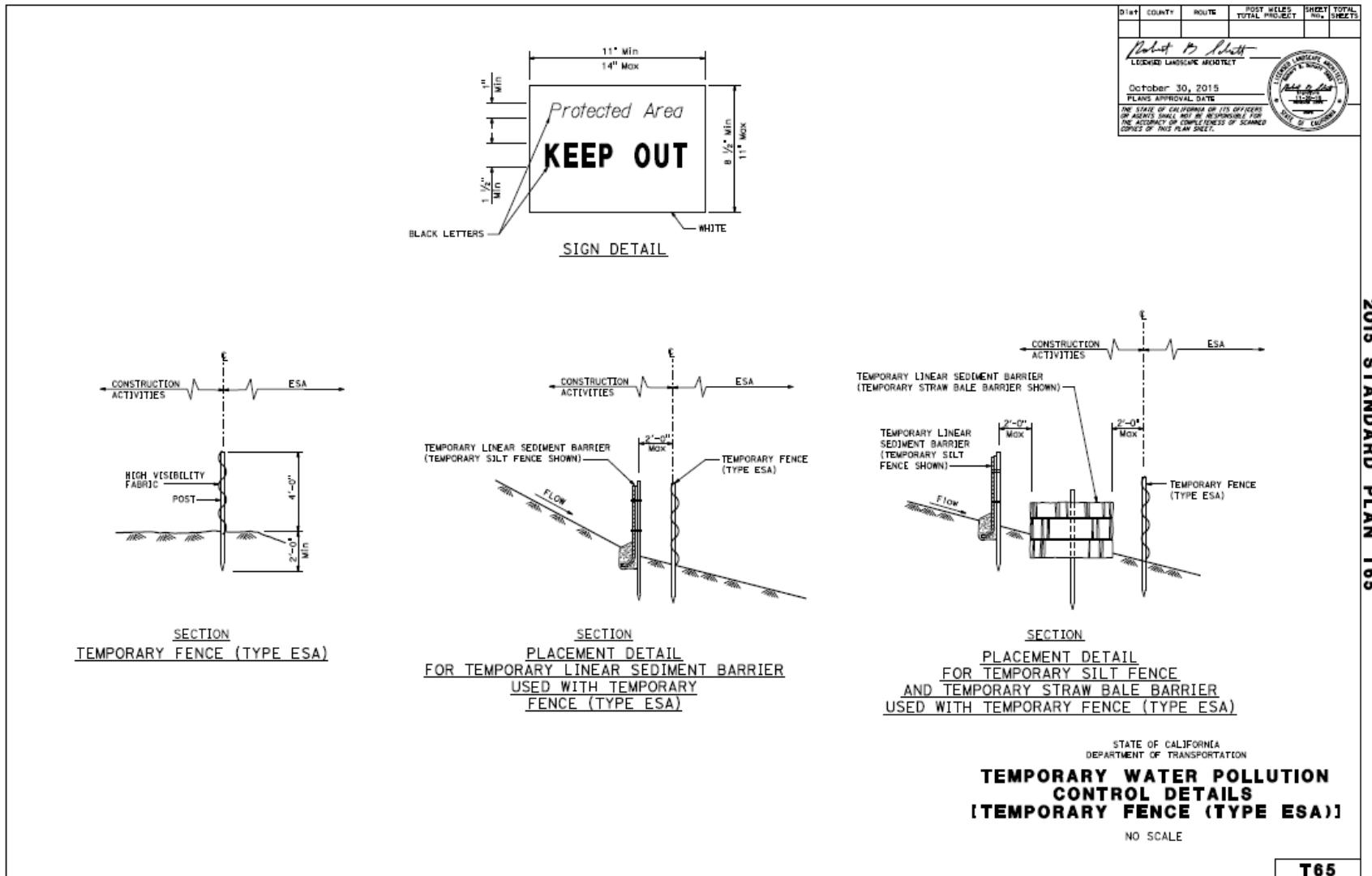
- Serious tree injuries must be attended to by an arborist.
- During construction, the District Environmental Branch must be contacted to ensure that ESAs are protected and any environmental regulations are followed.
- Existing Vegetated Areas to be Preserved must be clearly demarcated in the WPCDs.

SWPPP or WPCP

Preservation of Existing Vegetation must be discussed in Section 500.3 of the SWPPP or Section 30.2 of the WPCP.

Preservation of Existing Vegetation

SS-2



T65





Standard Symbol

BMP Objectives	
Soil Stabilization	☒
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☒
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

Hydraulic mulch consists of applying a mixture of natural fibers and a stabilizing compound with hydroseeding equipment to temporarily protect exposed soil from erosion by raindrop impact or wind. This is one of five temporary soil stabilization alternatives to consider.

Appropriate Applications

Hydraulic mulch is applied to disturbed areas requiring temporary protection until permanent vegetation is established, or disturbed areas that must be re-disturbed following an extended period of inactivity.

Limitations

Wood fiber hydraulic mulches are generally short-lived (only last a part of a growing season) and require (24 hours or more) time to dry before rainfall occurs to be effective.

Paper mulches are not permitted.

Avoid use in areas where the mulch would be incompatible with immediate future earthwork activities and would have to be removed.

Cellulose fiber mulches alone may not perform well on steep slopes or in coarse soils.

Standards and Specifications

General Requirements

See Standard Specifications Section 13-5.03D to 13-5.03G for placing various types of hydraulic mulch.

Standard Specifications Section 21-2.02D and 21-2.02E contain material specifications for fiber and tackifier, respectively.

A certificate of compliance, as required under Standard Specifications Section 21-2.01C(4), is required for tackifier and bonded fiber matrix (BFM).

Hydraulic matrices require time to dry before rainfall occurs to be effective. Refer to the manufacturer's specifications for drying times.

Avoid mulch over-spray onto the traveled way, sidewalks, lined drainage channels, and existing vegetation.

Selection of hydraulic mulches by the Contractor must be approved by a licensed professional.

Prior to application, roughen embankment and fill areas by rolling with a crimping or punching type roller or by track walking. Track walking should only be used where other methods are impractical.

Temporary Hydraulic Mulch

Temporary hydraulic mulch contains mixtures of fiber and tackifier that is applied to soil with hydraulic spray equipment.

Fiber for temporary hydraulic mulch must be at least 50 percent wood fiber. The remaining percentage must be cellulose fiber, alternate fiber, or a combination of these fibers.

Temporary hydraulic mulch application rates must follow the manufacturer's recommendations. If not provided, apply at a rate of 2,000 lb/ac.

Tackifier should be applied per the manufacturer's instructions for the slope, soil, and wind conditions

Temporary BFM Hydraulic Mulch

BFM contains 100% wood fiber and tackifier, sometimes combined with seed and fertilizer that is applied to soil hydraulically.

BFM applications rates must follow the manufacturer's recommendations. If not provided, apply at a rate of 3,500 lb/ac.

Tackifier used for BFM must be:

- Bonded to the fiber or prepackaged with the fiber by the manufacturer
- Contain a minimum of 10 percent of the combined weight of the dry fiber, activating agents, and additives
- Organic, high viscosity colloidal polysaccharide with activating agents or a blended hydrocolloid-based binder

Temporary Cementitious Binder Hydraulic Mulch

Temporary cementitious binder hydraulic mulch is a mixture of fiber and a cementitious binder that is applied to soil with hydraulic spray equipment.

Application rates of temporary cementitious binder hydraulic mulch must be according to the manufacturer's specifications. If not provided, apply at a rate of 2,000 lb/ac and cementitious binder at 4,000 lb/ac.

Additional standards for cementitious binder are provided in Section 13 5.03G.

Additional guidance on the selection of soil stabilization BMPs can be found in Appendix B of this Manual.

Maintenance and Inspection

A certificate of compliance under Standard Specifications Section 21-2.01C(4) for the applicable BMP must be submitted to the RE prior to application to ensure proper mix is being used.

It is recommended that a small test area/mock-up occurs prior to large area application to verify sufficient cover for the approved mix.

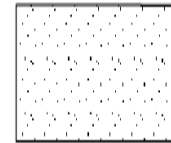
Maintain an unbroken, temporary mulched ground cover throughout the period of construction when the soils are not being reworked. Inspect before expected rain storms and repair any damaged ground cover and re mulch exposed areas of bare soil.

After any rainfall event, the Contractor is responsible for maintaining all slopes to prevent erosion.

Areas where Hydraulic Mulch will be implemented must be shown in the WPCDs and match site conditions.

SWPPP or WPCP

Hydraulic Mulch, Temporary BFM Hydraulic Mulch or Temporary Cementitious Hydraulic Mulch must be discussed in Section 500.3 of the SWPPP or Section 30.2 of the WP



Standard Symbol

BMP Objectives	
Soil Stabilization	☒
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☒
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

Hydroseeding typically consists of applying a mixture of wood, fiber, seed, fertilizer, and stabilizing emulsion with hydromulch equipment, which temporarily protects exposed soils from erosion by water and wind.

Appropriate Applications

Hydroseeding is applied on disturbed soil areas requiring temporary protection until permanent vegetation is established or disturbed soil areas that must be re-disturbed following an extended period of inactivity.

Can be used in conjunction with other rolled erosion control products.

Limitations

Hydroseeding may be used alone only when there is sufficient time in the season to ensure adequate vegetation establishment and erosion control. Otherwise, hydroseeding must be used in conjunction with a soil binder or mulch, such as SS-5 “Soil Binders” and SS-6 “Straw Mulch.”

Steep slopes are difficult to protect with temporary seeding.

Temporary seeding may not be appropriate in dry periods without supplemental irrigation.

Temporary vegetation may have to be removed before permanent vegetation is applied.

Temporary vegetation is not appropriate for short-term inactivity.

Hydroseeding should not be used in areas subject to heavy traffic.

Could trigger non-visible sampling if the appropriate application timeframe (before a rain event) and manufacturer recommendations are not followed.

Standards and Specifications

General Requirements

Refer to Standard Specifications Section 13-5.03I “Temporary Hydroseed.”

To select appropriate hydroseeding mixtures, an evaluation of site conditions shall be performed with respect to:

Soil conditions Maintenance requirements

Site topography– Sensitive adjacent areas

Season and climate – Water availability

Vegetation types– Plans for permanent vegetation

Selection of hydroseeding mixtures must be approved by the licensed professional.

Seed mix must comply with Standard Specifications Section 21-2.02F “Seed,” and the project’s special provisions.

Seed may be dry applied to small areas not accessible by hydroseeding equipment if authorized.

Seeds must not contain seeds of prohibited noxious weeds and more than 1.0% total weed seed by weight. Seeds must be delivered to the project site with each species in separate, unopened containers with the seed tag attached. Measure individual seed species and mix in the presence of the RE.

Fiber must be at least 50 percent wood fiber. The remaining percentage must be cellulose fiber, alternate fiber, or a combination of these fibers.

Commercial fertilizer must conform to the requirements of the California Food and Agricultural Code. Fertilizer can be pelleted or granular form.

Application Procedures

Prior to application, roughen the slope, fill area, or area to be seeded with the furrows trending along the contours. Rolling with a crimping or punching type roller or track walking is required on all slopes prior to hydroseeding. Track walking should only be used where other methods are impractical.

Add water to hydroseed materials as recommended by the manufacturer and mix sufficiently to ensure an even application. A dispersing agent may be added to the mixture if authorized.

Equipment must have a built-in continuous agitation and discharge system capable of producing a homogeneous mixture and a uniform application rate. The tank must have a minimum capacity of 1,000 gallons. A smaller tank can be used if authorized by the RE.

Apply temporary hydroseed at the following rates:

- Apply seed at rates specified in the project's erosion control plans.
- Apply fiber at 2,000 lb/ac.
- Apply tackifier according to manufacturer's recommendations for the slope, soil, and wind conditions.
- Apply materials in locations, rates, and number of applications shown and as follows:
- Start application within 60 minutes after adding seed to the tank.
- Apply in successive passes as necessary to achieve the specified application rate.
- Apply all hydroseed materials shown for a single area within 72 hours.

If hydroseed materials are applied to areas covered by Rolled Erosion Control Products (RECP), apply hydroseed materials to the RECP as follows:

- Verify the RECP is in uniform contact with the slope surface.
- Spray materials into the RECP perpendicular to the slope and integrate well.
- Do not displace or damage the RECP.
- After the final application, do not allow pedestrians or equipment on the treated areas.
- Follow-up applications shall be made as needed to cover weak spots, and to maintain adequate soil protection.
- Avoid over-spray onto the traveled way, sidewalks, lined drainage channels, and existing vegetation.

Additional guidance on the selection of soil stabilization BMPs can be found in Appendix B of this Manual.

Maintenance and Inspection

All seeded areas must be inspected for failures and re-seeded, fertilized, and mulched within the planting season, using not less than half the original application rates. Any temporary revegetation efforts that do not provide adequate cover must be reapplied at a scheduled recommended by the licensed professional.

A certificate of compliance under Standard Specifications Section 21-2.01C(4) for the applicable BMP must be submitted to the RE prior to application to ensure proper mix is being used.

It is recommended that a small test area/mock-up occurs prior to large area application to verify sufficient cover for the approved mix.

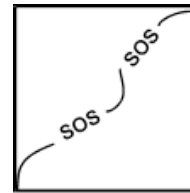
After any rain event, the Contractor is responsible for maintaining all slopes to prevent erosion.

Areas where Hydroseeding will be implemented must be shown in the WPCDs. Application timeframes (dates) must be included in the WPCS.

Must ensure correct application rates and passes (different directions) take place to ensure adequate coverage.

SWPPP or WPCP

Hydroseeding must be discussed in Section 500.3.2 of SWPPP or Section 30.2 of the WPCP.



Standard Symbol

BMP Objectives	
Soil Stabilization	☒
Sediment Control	☐
Tracking Control	☒
Wind Erosion Control	☒
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

Soil binders consist of applying and maintaining a soil stabilizer to exposed soil surfaces. Soil binders are materials applied to the soil surface to temporarily prevent water-induced erosion of exposed soils on construction sites. Soil binders also provide temporary dust, wind, and soil stabilization (erosion control) benefits. This is one of five temporary soil stabilization alternatives to consider.

Appropriate Applications

Soil binders are typically applied to disturbed areas requiring short-term temporary protection. Because soil binders can often be incorporated into the work, they may be a good choice for areas where grading activities will soon resume. Application on stockpiles to prevent water and wind erosion.

Limitations

Soil binders are temporary in nature and may need reapplication.

Soil binders require a minimum curing time until fully effective, as prescribed by the manufacturer. Soil binders may need reapplication after a storm event.

Soil binders will generally experience spot failures during heavy rainfall events. If runoff penetrates the soil at the top of a slope treated with a soil binder, it is likely that the runoff will undercut the stabilized soil layer and discharge at a point further down slope.

Soil binders do not hold up to pedestrian or vehicular traffic across treated areas.

Soil binders may not penetrate soil surfaces made up primarily of silt and clay, particularly when compacted.

Some soil binders may not perform well with low relative humidity. Under rainy conditions, some agents may become slippery or leach out of the soil.

May not cure if low temperatures occur within 24 hours of application.

Standards and Specifications

General Requirements

Site-specific soil types will dictate appropriate soil binders to be used.

A soil binder must be environmentally benign (non-toxic to plant and animal life), easy to apply, easy to maintain, economical, and shall not stain paved or painted surfaces, refer to Standard Specifications Section 13,18 and 21.

Some soil binders are compatible with existing vegetation.

Performance of soil binders depends on temperature, humidity, and traffic across treated areas.

Avoid over-spray onto the traveled way, sidewalks, lined drainage channels, and existing vegetation.

Storm water quality runoff sampling is required for many soil binders. Per table 5-1, footnote 7, of the 2013 Construction Site Monitoring Program Guidance Manual the following copolymers/polymers do not discharge pollutants and water quality sampling and analysis is not required Super Tak, M-binder, Fish Stik, Pro40dc, Fisch-Bond, Soil Master WR and EarthGuard.

Soil Binders Applications

After selecting an appropriate soil binder, the untreated soil surface must be prepared before applying the soil binder. The untreated soil surface must contain sufficient moisture to assist the agent in achieving uniform distribution. In general, the following steps shall be followed::

- Follow manufacturer's recommendations for application rates, pre-wetting of application area, and cleaning of equipment after use.
- Prior to application, roughen embankment and fill areas by rolling with a crimping or punching type roller or by track walking. Track walking shall only be used where rolling is impractical.
- Consider the drying time for the selected soil binder and apply with sufficient time before anticipated rainfall. Soil binders shall not be applied during or immediately before rainfall.
- Avoid over-spray onto the traveled way, sidewalks, lined drainage channels, sound walls, and existing vegetation.
- Soil binders shall not be applied to frozen soil, areas with standing water, under freezing or rainy conditions, or when the air temperature is below 40C (40oF) during the curing period.

- More than one treatment is often necessary, although the second treatment may be diluted or have a lower application rate.
- Generally, soil binders require a minimum curing time of 24 hours before they are fully effective. Refer to manufacturer's instructions for specific cure times.

For liquid agents:

- Crown or slope ground to avoid ponding.
- Uniformly pre-wet ground at 0.03 to 0.3 gal/yd² or according to manufacturer's recommendations.
- Apply solution under pressure. Overlap solution 6 to 12 in.
- Allow treated area to cure for the time recommended by the manufacturer; typically, at least 24 hours.
- In low humidities, reactivate chemicals by re-wetting with water at 0.1 to 0.2 gal/yd².

Selecting a Soil Binder

Properties of common soil binders used for erosion control are provided in Table 1 and Appendix B. Use Table 1 to select an appropriate soil binder.

Table 1 Properties of Soil Binders for Erosion Control				
Chemicals	Plant Material Based (Short Lived)	Plant Material Based (Long Lived)	Polymeric Emulsion Blends	Cementitious-Based Binders
Relative Cost	Low	Low	Low	Low
Resistance to Leaching	High	High	Low to Moderate	Moderate
Resistance to Abrasion	Moderate	Low	Moderate to High	Moderate to High
Longevity	Short to Medium	Medium	Medium to Long	Medium
Minimum Curing Time before Rain	9 to 18 hours	19 to 24 hours	0 to 24 hours	4 to 8 hours
Compatibility with Existing Vegetation	Good	Poor	Poor	Poor
Mode of Degradation	Biodegradable	Biodegradable	Photodegradable/ Chemically Degradable	Photodegradable/ Chemically Degradable
Labor Intensive	No	No	No	No
Specialized Application Equipment	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher
Liquid/Powder	Powder	Liquid	Liquid/Powder	Powder
Surface Crusting	Yes, but dissolves on rewetting	Yes	Yes, but dissolves on rewetting	Yes
Clean-Up	Water	Water	Water	Water
Erosion Control Application Rate	Varies ⁽¹⁾	Varies ⁽¹⁾	Varies ⁽¹⁾	4,500 to 13,500 kg/ha
(1) Dependent upon product, soil type, and slope inclination				

Factors to consider when selecting a soil binder include the following:

- Suitability to situation - Consider where the soil binder will be applied; determine if it needs a high resistance to leaching or abrasion, and whether it needs to be compatible with any existing vegetation. Determine the length of time soil stabilization will be needed, and if the soil binder will be placed in an area where it will degrade rapidly. In general, slope steepness is not a discriminating factor for the listed soil binders.
- Soil types and surface materials - Fines and moisture content are key properties of surface materials. Consider a soil binder's ability to penetrate, likelihood of leaching, and ability to form a surface crust on the surface materials.
- Frequency of application - The frequency of application can be affected by subgrade conditions, surface type, climate, and maintenance schedule. Frequent applications could lead to high costs. Application frequency may be minimized if the soil binder has good penetration, low evaporation, and good longevity. Consider also that frequent application will require frequent equipment clean-up.

After considering the above factors, the soil binders in Table 1 will be generally appropriate as follows:

Plant Material Based (Short Lived)

Guar: Guar gum based tackifier must be derived from the ground endosperm of the guar plant, *Cyanmopsis tetragonolobus*. It must be treated with dispersing agents for easy mixing.. It shall be diluted at the rate of 1 to 5 lb per 100 gallons of water, depending on application machine capacity. Recommended minimum application rates are as follows:

Application Rates for Guar Soil Stabilizer					
Slope (V:H):	Flat	1:4	1:3	1:2	1:1
Kg/Ha:	45	50	56	67	78
lb/ac	40	45	50	60	70

Psyllium: Psyllium is composed of the finely ground muciloid coating of plantago seeds that is applied as a dry powder or in a wet slurry to the surface of the soil. It dries to form a firm but rewettable membrane that binds soil particles together but permits germination and growth of seed. Psyllium requires 12 to 18 hours drying time. Psyllium shall be applied at a rate of 80 to 200 lb/ac, with enough water in solution to allow for a uniform slurry flow.

Starch: Starch is non-ionic, water soluble granular cornstarch. The material is mixed with water and applied at the rate of 150 lb/ac. Approximate drying time is 9 to 12 hours.

Plant Material Based (Long Lived)

Pitch and Rosin Emulsion: Generally, a non-ionic pitch and rosin emulsion has a minimum solids content of 48%. The rosin shall be a minimum of 26% of the total solids content. The soil stabilizer shall be non-

corrosive, water-dilutable emulsion that upon application cures to a water insoluble binding and cementing agent. For soil erosion control applications, the emulsion is diluted and shall be applied as follows:

For clayey soil: 5 parts water to 1 part emulsion

For sandy soil: 10 parts water to 1 part emulsion

Application can be by water truck or hydraulic seeder with the emulsion/product mixture applied at the rate specified by the manufacturer. Approximate drying time is 19 to 24 hours.

Polymeric Emulsion Blends

Acrylic Copolymers and Polymers: Polymeric soil stabilizers shall consist of a liquid or solid polymer or copolymer with an acrylic base that contains a minimum of 55% solids. The polymeric compound shall be handled and mixed in a manner that will not cause foaming or shall contain an anti-foaming agent. The polymeric emulsion shall not exceed its shelf life or expiration date; manufacturers shall provide the expiration date. Polymeric soil stabilizer shall be readily miscible in water, non-injurious to seed or animal life, non-flammable, shall provide surface soil stabilization for various soil types without totally inhibiting water infiltration, and shall not re-emulsify when cured. The applied compound shall air cure within a maximum of 36 to 48 hours. Liquid copolymer shall be diluted at a rate of 10 parts water to 1 part polymer and applied to soil at a rate of 1,175 gal/ac.

Liquid Polymers of Methacrylates and Acrylates: This material consists of a tackifier/sealer that is a liquid polymer of methacrylates and acrylates. It is an aqueous 100% acrylic emulsion blend of 40% solids by volume that is free from styrene, acetate, vinyl, ethoxylated surfactants or silicates. For soil stabilization applications, it is diluted with water in accordance with manufacturer's recommendations, and applied with a hydraulic seeder at the rate of 20 gal/ac. Drying time is 12 to 18 hours after application.

Copolymers of Sodium Acrylates and Acrylamides: These materials are non-toxic, dry powders that are copolymers of sodium acrylate and acrylamide. They are mixed with water and applied to the soil surface for erosion control at rates that are determined by slope gradient:

Slope Gradient (V:H)	kg/ha (lb/ac)
Flat to 1:5	3-5
1:5 to 1:3	5-10
1:2 to 1:1	10-20

Poly-Acrylamide and Copolymer of Acrylamide: Linear copolymer polyacrylamide is packaged as a dry-flowable solid. When used as a stand-alone stabilizer, it is diluted at a rate of 1 lb/100 gal of water and applied at the rate of 5 lb/ac.

Hydro-Colloid Polymers: Hydro-Colloid Polymers are various combinations of dry-flowable poly-acrylamides, copolymers and hydro-colloid polymers that are mixed with water and applied to the soil surface at rates of 53 to 62 lb/ac. Drying times are 0 to 4 hours.

Cementitious Based Binders

Gypsum: This is a formulated gypsum-based product that readily mixes with water and mulch to form a thin protective crust on the soil surface. It is composed of high purity gypsum that is ground, calcined and processed into calcium sulfate hemihydrate with a minimum purity of 86%. It is mixed in a hydraulic seeder and applied at rates 4,000 to 12,000 lb/ac. Drying time is 4 to 8 hours.

Additional guidance on the selection of soil stabilization BMPs can be found in Appendix B of this Manual.

Maintenance and Inspection

Reapplying the selected soil binder may be needed for proper maintenance. High traffic areas shall be inspected daily, and lower traffic areas shall be inspected weekly.

A certificate of compliance under Standard Specifications Section 21-2.01C(4) must be submitted to the RE prior to application.

It is recommended that a small test area/mock-up occurs prior to large area application to verify sufficient cover for the approved mix.

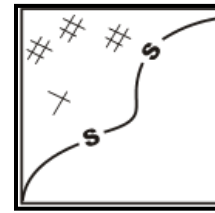
After any rainfall event, the Contractor is responsible for maintaining all slopes to prevent erosion.

Maintain an unbroken, temporary stabilized area while DSAs are inactive. Repair any damaged stabilized area and re-apply soil binder to exposed areas.

Cleaning of equipment must be done in a designated area that can collect the water to prevent triggering of non-visible and non-stormwater requirements.

SWPPP or WPCP

Soil Binders must be discussed in Section 500.3.2 of the SWPPP or Section 30.2 of the WPCP.



Standard Symbol

BMP Objectives	
Soil Stabilization	☒
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☒
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

Straw mulch consists of placing a uniform layer of straw and incorporating it into the soil with a studded roller, or anchoring it with a tackifier or Rolled Erosion Control Product (RECP). This is one of the temporary soil stabilization alternatives to consider.

Appropriate Applications

Straw mulch is typically used for soil stabilization as a temporary surface cover on disturbed areas until soils can be prepared for revegetation and permanent vegetation is established.

Also typically used in combination with temporary and/or permanent seeding strategies to enhance plant establishment.

Limitations

Availability of erosion control contractors and straw may be limited prior to the rain events due to high demand.

There is a potential for introduction of weed-seed and unwanted plant material.

Straw mulch applied by hand is more time intensive and potentially costly.

May have to be removed prior to permanent seeding or soil stabilization.

“Punching” of straw does not work in sandy soils, must use a tackifier.

Standards and Specifications

General Requirements

Straw and tackifier must conform to Standard Specifications Sections 21-2.02H, 21.2-03G and 21-2.02E.

Submit a certificate of compliance for straw before application. If weed-free straw is used, the certificate of compliance must include the certificate of quarantine compliance.

Straw must be derived from wheat, rice, or barley.

A tackifier is the preferred method for anchoring straw mulch to the soil on slopes.

Selected tackifier must be environmentally benign (non-toxic to plants and animal life) and does not pose a threat to water quality.

Crimping, “punch” roller-type rollers, or track-walking may also be used to incorporate straw mulch into the soil on slopes. Track walking shall only be used where other methods are impractical.

Avoid placing straw onto the traveled way, sidewalks, lined drainage channels, sound walls, and existing vegetation.

Straw mulch with tackifier should not be applied during or immediately before a rain event.

Application Procedures

Apply loose straw at the rate indicated either by machine or by hand distribution.

The straw mulch must be evenly distributed on the soil surface.

Straw may be anchored in place by incorporating it into soil or using a tackifier. Additionally, in small areas and/or steep slopes, straw mulch can also be held in place using Rolled Erosion Control Product. Refer to BMP SS-7, “Temporary Cover and Rolled Erosion Control Products.”

If a tackifier will be used to anchor the straw mulch in lieu of incorporation, roughen embankment or fill areas by rolling with a crimping or punching-type roller. Track walking should only be used where rolling is impractical.

A tackifier acts to glue the straw fibers together and to the soil surface. Factors influencing tackifier selection include longevity and ability to hold the fibers in place.

Apply tackifier according to the manufacturer’s instructed rate for the slope, soil, and wind conditions.

If incorporation of straw mulch into soil is the selected method for anchoring, then do as follows:

- A spade or shovel can be used to incorporate straw into soil in small areas.

- On slopes with soils that are stable enough and of sufficient gradient to safely support construction equipment without contributing to compaction and instability problems, straw can be “punched” into the ground using a knife-blade roller or a straight bladed coulter, known commercially as a “crimper” under Section 21-2.03J of the Standard Specifications.

Maintenance and Inspection

Straw needs to last long enough to achieve erosion control objectives.

Maintain an unbroken, temporary mulched ground cover while DSAs are inactive. Repair any damaged ground cover and re-mulch exposed areas.

Reapplication of straw mulch and tackifier may be required by the RE to maintain effective soil stabilization over disturbed areas and slopes.

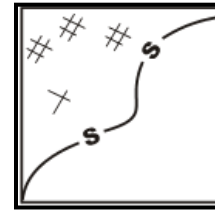
After any rainfall event, the Contractor is responsible for maintaining all slopes to prevent erosion.

SWPPP or WPCP

Straw Mulch must be discussed in Section 500.3.2 of the SWPPP or Section 30.2 of the WPCP.

Temporary Cover and Rolled Erosion Control Products

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Standard Symbol

BMP Objectives	
Soil Stabilization	☒
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☒
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

This BMP involves the placement of geosynthetics, turf reinforcement mats, plastic covers, or rolled erosion control products (RECPs), including erosion control blankets, to stabilize disturbed soil areas and protect soils from erosion by wind or water. This is one of the temporary soil stabilization alternatives to consider.

Appropriate Applications

These measures are used when disturbed soils may be particularly difficult to stabilize, including the following situations:

- Steep slopes, generally steeper than 3:1 (H:V).
- Slopes where the erosion potential is high.
- Slopes and disturbed soils where mulch must be anchored.
- Disturbed areas where plants are slow to develop.
- Channels with flows exceeding 3 ft/s.
- Channels to be vegetated.
- Slopes adjacent to receiving waters or ESAs.

Standards for plastic sheeting used for stockpile covers are provided in Section 14-11.05A of the Standard Specifications.



Temporary Cover and Rolled Erosion Control Products

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Limitations

Blankets and mats are typically more expensive than other erosion control measures, due to labor and material costs. This usually limits their application to areas inaccessible to hydraulic equipment, or where other measures are not applicable, such as channels.

May delay seed germination due to reduction in soil temperature.

Plastic netting should not be used when regulatory permits prohibit their use or if there is a potential for plastic netting to endanger wildlife.

Blankets and mats are generally not suitable for excessively rocky sites or areas where the final vegetation will be mowed (since staples and netting can catch in mowers).

Blankets and mats should be removed and disposed of prior to application of permanent soil stabilization measures as required by the contract plans. Long-term erosion control blankets must be Class 8 Rock Slope Protection fabric.

Plastic sheeting is easily vandalized, easily torn, photodegradable, and must be disposed of at a landfill and requires extensive inspection and maintenance.

Plastic results in 100 percent runoff, which may cause serious erosion problems in the downstream areas receiving the increased flow.

The use of plastic should be limited to covering stockpiles, or very small graded areas for short periods of time (such as through one imminent storm event), until alternative measures, such as seeding and mulching, can be installed.

Geosynthetics, mats, plastic covers, and RECPs have maximum flow rate limitations; consult the manufacturer for proper selection.

Additional guidance for selection of soil stabilization BMPs is provided in Appendix B of this Manual.

Standards and Specifications

Material Selection

There are many types of temporary cover material and RECPs, and selection of the appropriate type is based on the specific type of application and site conditions. Selection(s) made by the Contractor must be approved by the Resident Engineer; certification of compliance must be in accordance with Standard Specifications Sections 6-2 and 21-2.01C and 21-2.02O.

Temporary Cover: Geosynthetics

Material shall be a woven polypropylene fabric with minimum thickness of 0.06 inch, minimum width of 12 feet and meet all requirements of Standard Specification Section 96-1 Temporary Cover. Material shall have



Temporary Cover and Rolled Erosion Control Products

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a minimum tensile strength of 150 lb (warp) and 80 lbs (fill) in conformance with the requirements in ASTM Designation: D 4632. The permittivity of the fabric must be approximately 0.07 sec –1 in conformance with the requirements in ASTM Designation: D4491. The fabric must have an ultraviolet (UV) stability of 70 percent in conformance with the requirements in ASTM designation: D4355. Geotextile blankets should be secured in place with wire staples or sandbags and by keying into tops of slopes and edges to prevent infiltration of surface water. Staples should be made of minimum 16 gauge steel wire and be U-shaped with 8-inch legs and 2-inch crown.

Geotextiles may be reused if, in the opinion of the RE, they are suitable for the use intended.

Submit a certificate of compliance for each type of geosynthetic material used.

Temporary Cover: Plastic Sheeting

Plastic sheeting shall comply with Standard Specification Section 13-5 and 96-1 which requires a minimum thickness of 0.39 inches, and be keyed in at the top of slope and firmly held in place with gravel-filled bags placed no more than 6 feet apart or other weights authorized by the RE. Seams are typically taped or weighted down their entire length, and there should be at least a 12 to 24 inches overlap of all seams. Edges must be embedded a minimum of 6 inches in soil.

All sheeting must be inspected periodically after installation and after rain events to check for erosion, undermining, and anchorage failure. Any failures must be repaired immediately. If washout or breakages occurs, the material should be re-installed after repairing the damage to the slope or area.

Rolled Erosion Control Products

RECPs are typically composed of jute fibers, curled wood fibers, straw, coconut fiber, or a combination of these materials. For an RECP to be considered 100 percent biodegradable, the netting, sewing or adhesive system that holds the biodegradable mulch fibers together must also be biodegradable.

- Jute mesh is made from a natural fiber that is spun into a yarn, then loosely woven into a biodegradable mesh. It is designed to be used in conjunction with vegetation and has longevity of approximately one year. The material is supplied in rolled strips that are secured to the soil with steel U-shaped staples. Jute mesh shall comply with all requirements of Jute mesh table included in Standard Specification Section 21-2.
- Erosion control blanket is a machine-produced mat made of processed natural fibers that are bound together to form a continuous matrix surrounded by two natural nets. The processed natural fibers comprising the matrix of the blanket may be a mixture of straw (70 percent) and coconut (30 percent), woven coir (100 percent), or excelsior (curled wood fiber) (80 percent). Erosion control blankets must be furnished in rolled strips a minimum of 72 inches wide, and secured in place with steel U-shaped staples. Erosion control blankets must also comply with Section 21-2.02O(4) of the Standard Specifications.



Temporary Cover and Rolled Erosion Control Products

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- Netting consists of pure coconut fibers, or coir, woven into a matrix. Coir netting must be furnished in rolled strips a minimum of 72 to 158 inches in width and 0.3 inches thick. There are three classes of coir netting: Type A, Type B, and Type C. See Section 21-2.02O(3) of the Standard Specifications for the minimum requirements for each type of netting.

Non-biodegradable RECPs are typically composed of polypropylene, polyethylene, nylon or other synthetic fibers. In some cases, a combination of biodegradable and synthetic fibers is used to construct the RECP. Netting used to hold these fibers together is typically non-biodegradable as well. Check contract special provisions to determine whether non-biodegradable products are not to be used based on regulatory requirements.

- Turf reinforcement mat is a nondegradable, open-weave textile made of synthetic fibers, filaments, nets, wire mesh, or other elements processed into a permanent three-dimensional matrix. Turf reinforcement mats must be a minimum of 72 inches in width and 0.25 inches thick. There are three classes of turf reinforcement mat: Type A, Type B, and Type C. See section 21-2.02O(5) of the Standard Specifications for the minimum requirements for each type of netting.
- Plastic netting is a lightweight biaxially-oriented netting designed for securing loose mulches like straw to soil surfaces to establish vegetation. The netting is photodegradable. The netting is supplied in rolled strips, which should be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- Plastic mesh is an open-weave geotextile that is composed of an extruded synthetic fiber woven into a mesh with an opening size of less than 0.25 inch. It is used with revegetation or may be used to secure loose fiber such as straw to the ground. The material is supplied in rolled strips, which should be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- Synthetic fiber with netting is a mat that is composed of durable synthetic fibers treated to resist chemicals and ultraviolet light. The mat is a dense, three-dimensional mesh of synthetic (typically polyolefin) fibers stitched between two polypropylene nets. The mats are designed to be revegetated and provide a permanent composite system of soil, roots, and geomatrix. The material is furnished in rolled strips, which should be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- Bonded synthetic fibers consist of a three-dimensional geomatrix nylon (or other synthetic) matting. Typically it has more than 90 percent open area, which facilitates root growth. Its tough root-reinforcing system anchors vegetation and protects against hydraulic lift and shear forces created by high volume discharges. It can be installed over prepared soil, followed by seeding into the mat. Once vegetated, it becomes an invisible composite system of soil, roots, and geomatrix. The material is furnished in rolled strips that should be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- Combination synthetic and biodegradable RECPs consist of biodegradable fibers, such as wood fiber or coconut fiber, with a heavy polypropylene net stitched to the top and a high-strength continuous-filament geomatrix or net stitched to the bottom. The material is designed to enhance revegetation.



Temporary Cover and Rolled Erosion Control Products

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The material is furnished in rolled strips, which should be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

Site Preparation

Proper site preparation is essential to ensure complete contact of the blanket or matting with the soil.

Grade and shape the area of installation.

Remove all rocks, clods, vegetation or other obstructions larger than 1 inch in size. Fill voids or depressions.

Proper site preparation ensures that the products and covers will have complete, direct contact with the soil.

Seeding

If applicable, seed the area before RECP installation for erosion control and revegetation.

Check all slots and other areas disturbed during installation must be re-seeded.

For turf reinforcement mats, seeding is often specified to occur after installation.

Anchoring

U-shaped wire staples, metal stake pins, triangular wooden stakes, or fasteners recommended by manufacturers can be used to anchor mats and blankets to the ground surface in conformance with Standard Specification section 13-10.

Staples should be made of minimum 16 gauge steel wire and be U-shaped with 8-inch legs and 2-inch crown.

Metal stake pins should be 0.188 inch diameter steel with a 1.5 inch steel washer at the head of the pin, and 8 inch in length.

Wire staples and metal stakes should be driven flush to the soil surface.

All anchors should be 6 inch to 18 inch long and have sufficient ground penetration to resist pullout. Longer anchors may be required for loose soils.

Installation on Slopes

Refer to Standard Plans T53 and T54 for details regarding installation on slopes for temporary uses, and H52 for permanent uses.

Installation in Channels

Refer to Standard Plan T55 for details regarding installation in channels.

Installation shall be in accordance with the manufacturer's recommendations. In general, these will be as follows:



Temporary Cover and Rolled Erosion Control Products

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- Dig initial anchor trench 12 in deep and 6 in wide across the channel at the lower end of the project area.
- Excavate intermittent check slots, 6 in deep and 6 in wide across the channel at 25 ft to 30 ft intervals along the channels.
- Cut longitudinal channel anchor slots 4 in deep and 4 in wide along each side of the installation to bury edges of matting, whenever possible extend matting 2 in to 3 in above the crest of the channel side slopes.
- Beginning at the downstream end and in the center of the channel, place the initial end of the first roll in the anchor trench and secure with fastening devices at 12 in intervals. Note: matting will initially be upside down in anchor trench.
- In the same manner, position adjacent rolls in anchor trench, overlapping the preceding roll a minimum of 3 in.
- Secure these initial ends of mats with anchors at 12 in intervals, backfill and compact soil.
- Unroll center strip of matting upstream. Stop at next check slot or terminal anchor trench. Unroll adjacent mats upstream in similar fashion, maintaining a 3 in overlap.
- Fold and secure all rolls of matting snugly into all transverse check slots. Lay mat in the bottom of the slot then fold back against itself. Anchor through both layers of mat at 12 in intervals, then backfill and compact soil. Continue rolling all mat widths upstream to the next check slot or terminal anchor trench.
- Alternate method for non critical installations: Place two rows of anchors on 6 in centers at 25 ft to 30 ft intervals in lieu of excavated check slots.
- Shingle lap spliced ends by a minimum of 12 in apart on 12 in intervals.
- Place edges of outside mats in previously excavated longitudinal slots, anchor using prescribed staple pattern, backfill and compact soil.
- Anchor, fill and compact upstream end of mat in a 12 in by 6 in terminal trench.
- Secure mat to ground surface using U-shaped wire staples, geotextile pins, or wooden stakes.
- Seed and fill turf reinforcement matting with soil, if specified.

Soil Filling (if specified for turf reinforcement)

Always consult the manufacturer's recommendations for installation.

Do not drive tracked or heavy equipment over mat.

Avoid any traffic over matting if loose or wet soil conditions exist.

Use shovels, rakes or brooms for fine grading and touch up.

Smooth out soil filling, just exposing top netting of mat.



Temporary Cover and Rolled Erosion Control Products

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Temporary Soil Stabilization Removal

When no longer required for the work, temporary soil stabilization becomes the property of the Contractor.

Temporary soil stabilization removed from the site of the work must be disposed of outside the highway right-of-way in conformance with the provisions in Standard Specifications Section 14-10. If approved by the RE, the contractor may leave the temporary soil stabilizer in place.

Maintenance and Inspection

Areas treated with temporary soil stabilization must be inspected as specified in the Standard Specifications and special provisions. Areas treated with temporary soil stabilization must be maintained to provide adequate erosion control. Temporary soil stabilization should be reapplied or replaced on exposed soils when area becomes exposed or exhibits visible erosion.

- All blankets and mats must be inspected periodically after installation.
- Installation should be inspected after significant rain events to check for erosion and undermining. Any failures must be repaired immediately.
- If washout or breakage occurs, re-install the material after repairing the damage to the slope or channel.

SWPPP or WPCP

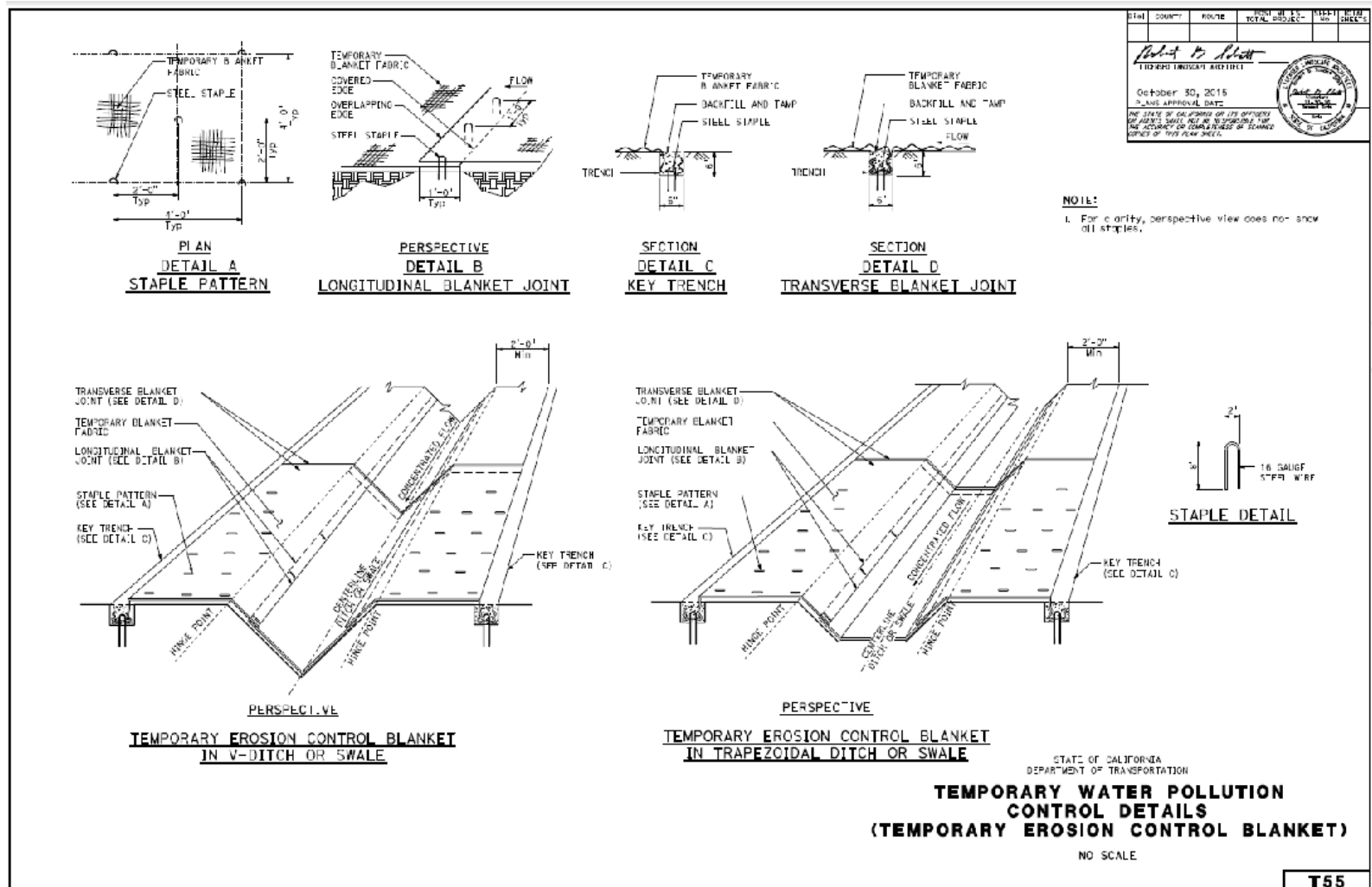
RECP must be discussed in Section 500.3.2 of the SWPPP or Section 30.2 of the WPCP.



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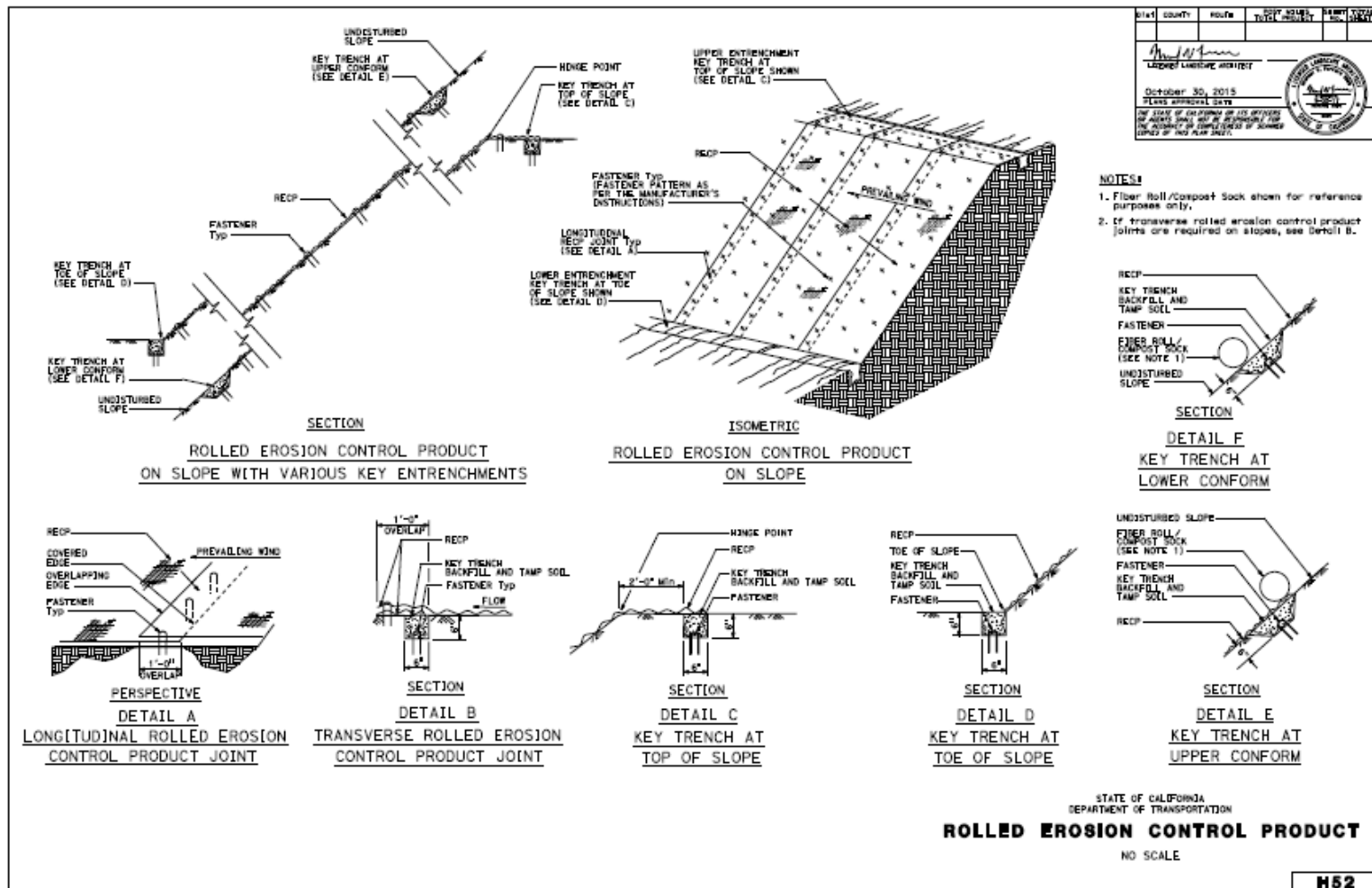
Temporary Cover and Rolled Erosion Control Products

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2015 STANDARD PLAN H52





Standard Symbol

BMP Objectives	
Soil Stabilization	☒
Sediment Control	☒
Tracking Control	☐
Wind Erosion Control	☒
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

Wood mulching consist of applying a mixture of shredded bark, wood chips, or tree trimmings on top of soil. Wood mulch is mostly applicable to landscape projects.

The primary function of wood mulching is to reduce erosion by protecting bare soil from rainfall impact, increasing infiltration, and reducing runoff.

Appropriate Applications

Wood mulching is considered a temporary soil stabilization alternative in the following situations:

- As a stand-alone temporary surface cover on disturbed areas until soils can be prepared for revegetation and permanent vegetative cover can be established.
- As short term, non-vegetative ground cover on slopes to reduce rainfall impact, decrease the velocity of sheet flow, settle out sediment and reduce wind erosion.
- In combination with other BMPs, mulch may be used to stabilize roadway embankment slopes and control wind erosion.

Limitations

Wood mulch may introduce unwanted species of vegetation.

Shredded wood does not withstand concentrated flows and is prone to sheet erosion.

Green material has the potential for the presence of unwanted weeds and other plant materials. Delivery system is primarily by manual labor, although pneumatic application equipment is available.

Mulch may need to be removed prior to further earthwork.

Mulch should not be used alone to stabilize embankments or sides of swales where concentrated flows could mobilize the material.

Standards and Specifications

Mulch Selection

There are many types of mulches, including tree bark mulch, wood chip mulch, shredded bark mulch, and tree trimming mulch. Selection of the appropriate type should be based on the type of application and site conditions. Prior to use of wood mulches, obtain concurrence with the District Landscape Architect because some mulch used on construction projects may not be compatible with planned or future projects.

Selection of wood mulches must comply with Standard Specifications Section 20-5.03E, and must be approved by the RE.

Tree Bark Mulch

Tree bark mulch must be derived from cedar, Douglas fir, or redwood tree species.

Tree bark mulch must be ground such that at least 95 percent of the material by volume is less than 2 inches in any direction and no more than 30 percent by volume is less than 1 inch in any direction.

Wood Chip Mulch

Wood chip mulch must be derived from clean wood, and it may not contain leaves or small twigs.

Wood chip mulch must contain at least 95 percent wood strands by volume with an average thickness of 1/8 to 1-1/2 inches in any direction and 2 to 8 inches in length.

Shredded Bark Mulch

Shredded bark mulch must be derived from trees. The mulch must be a blend or loose, long, thin wood or bark pieces.

Shredded bark mulch must contain at least 95 percent wood strands by volume with an average thickness of 1/8 to 1-1/2 inches in any direction and 2 to 8 inches in length

Tree Trimming Mulch

Tree trimming mulch is derived from chipped trees and may contain leaves, small twigs, and green material.

Tree trimming mulch must contain at least 95 percent material by volume less than 3 inches and no more than 30 percent by volume less than 1 inch

Application Procedures

Do not use soil sterilant or filter fabric.

Mulch should be placed uniformly from the outside edge of area designated for mulch. Permanent, landscape mulch should be placed after vegetation has been installed.

Mulch may be installed by manual application or with pneumatic devices.

Do not place mulch within 4 ft of the flow line of drainage ditches or other channels, or the edge of paved roads.

All material must be removed before re-starting work on the slopes.

Maintenance and Inspection

Wood mulch needs to last long enough to achieve erosion-control objectives. If the mulch is applied as a stand-alone erosion control method over disturbed areas (without seed), it should last the length of time the site will remain barren or until final re-grading and revegetation. Additional information is provided in Appendix B of this Manual.

Where vegetation is not the ultimate cover, such as ornamental and landscape applications of bark or wood chips, inspection and maintenance should focus on longevity and integrity of the mulch.

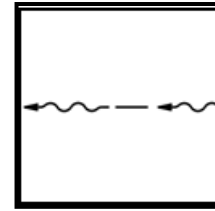
May require reapplication when bare soil becomes visible.

SWPPP or WPCP

Wood Mulch must be discussed in Section 500.3 of the SWPPP or Section 30.2 of the WPCP.

Earth Dikes/Drainage Swales and Lined Ditches

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Standard Symbol

BMP Objectives	
Soil Stabilization	☒
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

These are structures that intercept, divert and convey surface run-on, generally sheet flow, to prevent erosion.

Appropriate Applications

Earth dikes/drainage swales and lined ditches may be used to:

- Convey surface runoff down sloping land.
- Intercept and divert runoff to avoid sheet flow over sloped surfaces.
- Divert and direct runoff towards a stabilized watercourse, drainage pipe or channel.
- Intercept runoff from paved surfaces.

Earth dikes/drainage swales and lined ditches also may be used:

- Below steep grades where runoff begins to concentrate.
- Along roadways and facility improvements subject to flood drainage.
- At the top of slopes to divert run-on from adjacent or undisturbed slopes.
- At bottom and mid-slope locations to intercept sheet flow and convey concentrated flows.

Limitations

Earth dikes/drainage swales and lined ditches are not suitable as sediment trapping devices.

May be necessary to use other soil stabilization and sediment controls, such as check dams, plastics, and blankets, to prevent scour and erosion in newly graded dikes, swales and ditches.



Earth Dikes/Drainage Swales and Lined Ditches

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Temporary swales and ditches should not or any other runoff diversion device should not adversely impact upstream or downstream properties.

Standards and Specifications

Standard Specification Section 19-6 “Embankment Construction,” which covers allowable materials and construction procedures for dikes.

Standard Specification Section 72-5 “Concrete Slope Protection, Gutter, Ditch and Channel Lining” covers ditch and channel lining materials and construction procedures.

Care must be applied to correctly size and locate earth dikes, drainage swales and lined ditches. Excessively steep, unlined dikes and swales are subject to erosion and gully formation.

Must complete a careful evaluation of the risks due to erosion of the selected measure based on flow velocity, soil types, potential for over topping, flow backups, washouts, and drainage patterns for each BMP location.

Conveyances shall be stabilized. Consider using a lined ditch for high flow velocities to prevent scour. Compact any fills or backfills to prevent unequal settlement.

Do not divert runoff from the highway right-of-way onto other property.

When possible, install and utilize permanent dikes, swales and ditches early in the construction process.

Earthen berms should be 8 inches tall and 36 inches wide at a minimum. Earthen berms must be compacted either by hand or mechanical methods.

Provide stabilized outlets. Refer to SS-10, “Outlet Protection/Velocity/ Dissipation Devices.”

Maintenance and Inspection

Inspect temporary measures prior to, daily during extended rain events post-storm and weekly year-round.

Inspect ditches and berms for washouts. Replace lost riprap, damaged linings or soil stabilizers as needed.

Inspect channel linings, embankments, and beds of ditches and berms for erosion and accumulation of debris and sediment.

Remove debris and sediment, and repair linings and embankments to ensure they function as intended.

Temporary conveyances should be completely removed as soon as the surrounding drainage area has been stabilized, or at the completion of construction.



Earth Dikes/Drainage Swales and Lined Ditches

SS-9

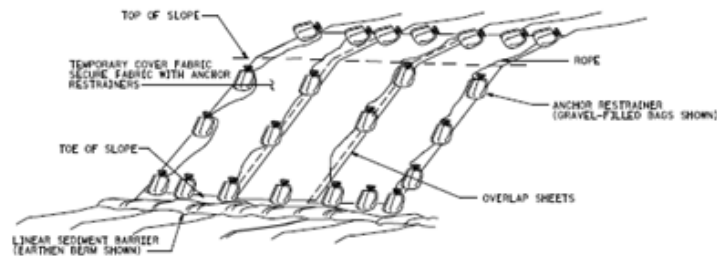
SWPPP or WPCP

Earth Dikes/Drainage Swales and Lined Ditches must be discussed in Section 500.3.2 of SWPPP or Section 30.2 of the WPCP.

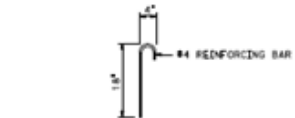


Earth Dikes/Drainage Swales and Lined Ditches

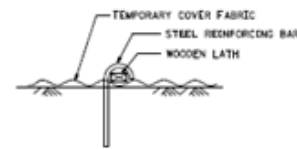
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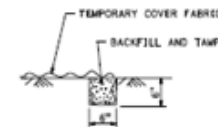
**PERSPECTIVE
TEMPORARY COVER ON SLOPE**



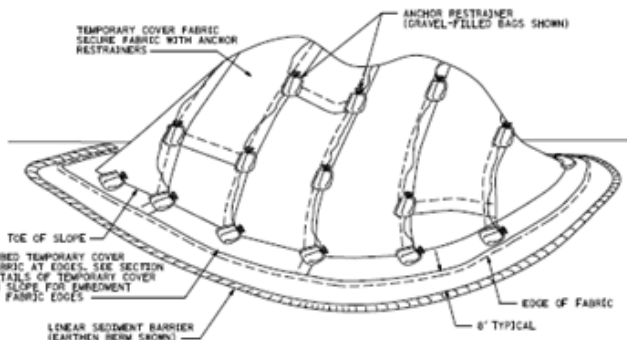
STEEL REINFORCING BAR DETAIL



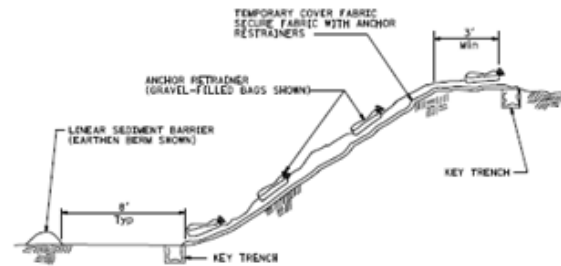
**SECTION
ANCHOR RESTRAINER**
(Steel bar and wooden lath)



**SECTION
KEY TRENCH DETAIL**



**PERSPECTIVE
TEMPORARY COVER ON STOCKPILE**



**SECTION
TEMPORARY COVER ON SLOPE**

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**TEMPORARY WATER POLLUTION
CONTROL DETAILS
(TEMPORARY COVER)**

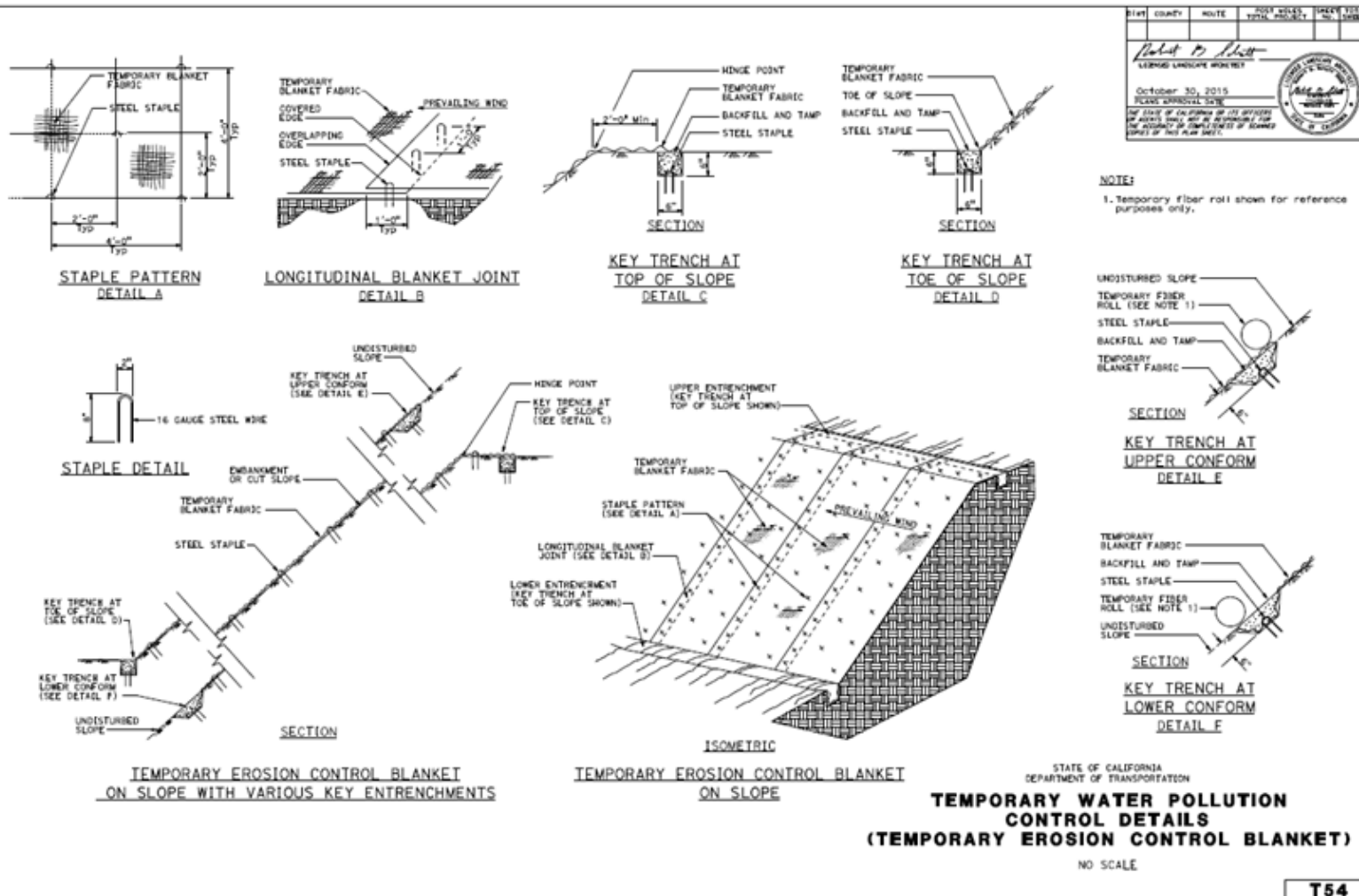
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T53



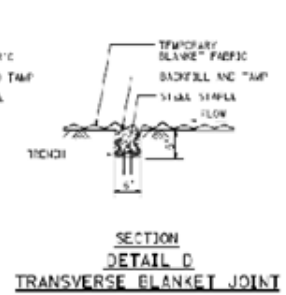
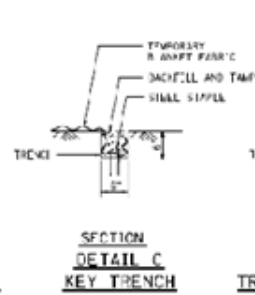
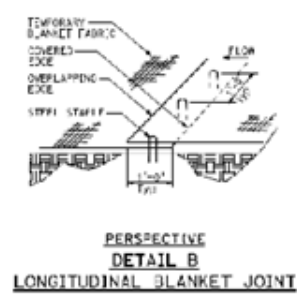
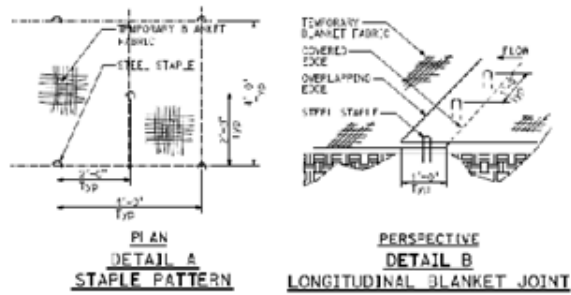
Earth Dikes/Drainage Swales and Lined Ditches

SS-9



Earth Dikes/Drainage Swales and Lined Ditches

SS-9



DATE	COUNTY	ROUTE	SECTION	POST MILE	POST MILE

Print to Scale

October 30, 2015

16 GAUGE STEEL STAPLE

NO SCALE

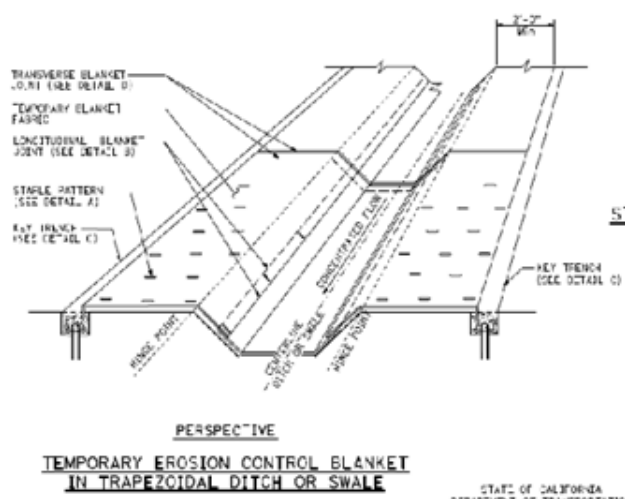
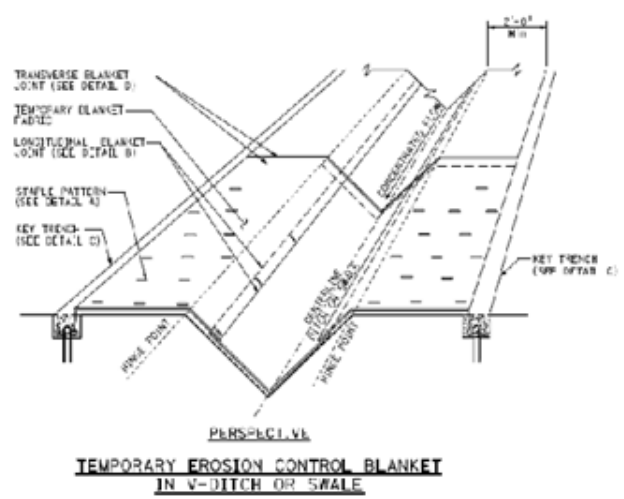
THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

DESIGNED BY: [Signature]

CHECKED BY: [Signature]

APPROVED BY: [Signature]

NOTE:
1. For clarity, perspective view does not show all staples.



STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

**TEMPORARY WATER POLLUTION
CONTROL DETAILS
(TEMPORARY EROSION CONTROL BLANKET)**

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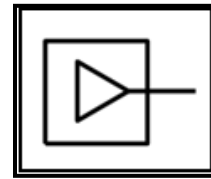
T55

CALTRANS STORM WATER QUALITY HANDBOOKS



Outlet Protection/Velocity Dissipation Devices

SS-10



Standard Symbol

BMP Objectives	
Soil Stabilization	☒
Sediment Control	☒
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

These devices are placed at pipe outlets to prevent scour and reduce the velocity and/or energy of stormwater flows.

Appropriate Applications

These devices may be used at the following locations:

- Outlets of pipes, drains, culverts, slope drains, diversion ditches, swales, conduits or channels.
- Outlets located at the bottom of mild to steep slopes.
- Discharge outlets that carry continuous flows of water.
- Outlets subject to short, intense flows of water, such as flash floods.
- Points where lined conveyances discharge to unlined conveyances.

Limitations

Loose rock may have stones washed away during high flows.

Grouted rock slope protection may break up in areas of freeze and thaw.

If there is not adequate drainage, and water builds up behind grouted rock slope protection, it may cause the grouted rock slope protection to break up due to the resulting hydrostatic pressure.

Outlet protection may negatively impact the channel habitat.



Outlet Protection/Velocity Dissipation Devices

SS-10

Standards and Specifications

There are many types of energy dissipaters; a flared end section and rock slope protection is shown in the figure on the previous page. Please note that this is only one example and the RE may approve other types of devices proposed by the contractor.

Flared end sections must comply with Standard Specification 70-5.02.

Rock slope protection must comply with Standard Specification Section 72.

Install rock slope protection, grouted rock slope protection, or concrete apron at selected outlet. Rock slope protection aprons are best suited for temporary use during construction.

Carefully place rock slope protection to avoid damaging the filter fabric.

For proper operation of apron:

- Align apron with receiving stream and keep straight throughout its length. If a curve is needed to fit site conditions, consider placing it in upper section of apron.
- If size of apron rock slope protection is large, consider protecting underlying filter fabric with a gravel blanket.

Outlets on slopes steeper than 10% should have additional protection.

Maintenance and Inspection

At a minimum, perform inspections weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

Minimize areas of standing water by removing sediment blockages and filling scour depressions. If persistent, it might be necessary to have licensed professional re-evaluate size and type of device implemented.

Inspect apron for displacement of the rock slope protection and/or damage to the underlying fabric. Repair fabric and replace rock slope protection that has washed away.

Inspect for scour beneath the rock slope protection and around the outlet. Repair damage to slopes or underlying filter fabric immediately.

Temporary devices should be completely removed as soon as the surrounding drainage area has been stabilized, or at the completion of construction.



Outlet Protection/Velocity Dissipation Devices

SS-10

SWPPP or WPCP

Outlet Protection/Velocity Dissipation Devices must be discussed in Section 500.3.2 of SWPPP or Section 30.2 of the WPCP.





Standard Symbol

BMP Objectives	
Soil Stabilization	☒
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

A slope drain is a pipe used to intercept and direct surface runoff or groundwater into a stabilized watercourse, trapping device or stabilized area. Slope drains are used with lined ditches to intercept and direct surface flow away from slope areas to protect cut or fill slopes.

Appropriate Applications

Slope drains may be used on construction sites where slopes may be eroded by surface runoff.

Drainage for top of slope dikes or swales.

Drainage for top of cut and fill slopes where water can accumulate.

Emergency spillway for a sediment basin.

Limitations

Severe erosion may result when slope drains fail by overtopping, piping, or pipe separation.

Sediment accumulation, scour depressions, and/or persistent non-stormwater discharges in energy dissipaters associated with slope drain outlets can result in suitable areas for vector production.

Standards and Specifications

Maximum slope generally limited to 2:1 (H:V), as energy dissipation below steeper slopes is difficult.

Direct surface runoff to slope drains with interceptor dikes. See BMP SS 8, “Earth Dikes/Drainage Swales, and Lined Ditches.”

Slope drains can be placed on or buried underneath the slope surface.

Recommended materials are plastic or corrugated metal, or comparable pipe.

When installing slope drains:

- Install slope drains perpendicular to slope contours.
- Compact soil around and under entrance, outlet, and along length of pipe.
- Securely anchor and stabilize pipe and appurtenances into soil.
- Check to ensure that pipe connections are water tight.
- Protect area around inlet with filter cloth. Protect outlet with rock slope protection or other energy dissipation device. For high energy discharges, reinforce rock slope protection with concrete or use reinforced concrete device.
- Protect inlet and outlet of slope drains; use standard flared end section at entrance and exit for pipe slope drains 12 in and larger.

Maintenance and Inspection

Inspect before, daily during and after each rain event, and weekly during the duration of the construction project. Inspect outlet for erosion and downstream scour.

If eroded, repair damage and install additional energy dissipation measures. If downstream scour is occurring, it may be necessary to reduce flows being discharged into the channel.

Inspect slope drainage for accumulations of debris and sediment.

Remove built-up sediment from entrances, outlets, and within drains as required.

Make sure stormwater is not ponding onto inappropriate areas (e.g., active traffic lanes, material storage areas, etc.).

SWPPP or WPCP

Slope Drains must be discussed in Section 500.3.2 of SWPPP or Section 30.2 of the WPCP.



Standard Symbol

BMP Objectives	
Soil Stabilization	☒
Sediment Control	☒
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

Drainage systems including the stream channel, streambank, and associated riparian areas, are dynamic and sensitive ecosystems that respond to changes in land use activity. Streambank and channel disturbance resulting from construction activities can increase the stream's sediment load, which can cause channel erosion or sedimentation and have adverse affects on the biotic system. BMPs can reduce the discharge of sediment and other pollutants and minimize the impact of construction activities on watercourses. Streams included on the 303(d) list by the State Water Resources Control Board (SWRCB) may require careful evaluation to prevent any increases in sedimentation, siltation and/or turbidity to the stream.

Appropriate Applications

These procedures typically apply to all construction projects that disturb or occur within stream channels and their associated riparian areas. Streambank stabilization typically consists of a combination of several BMPs to prevent destabilization and enhance stability of eroding streambanks.

Limitations

Specific permit requirements or mitigation measures such as Regional Water Quality Control Board (RWQCB) 401 Certification, U.S. Army Corps of Engineers 404 permit and approval by California Department of Fish and Wildlife Service may be included in contract documents. Specific requirements could include in-water work windows, vegetation species, seed mixes, stabilization measures, water quality monitoring protocols and specific reporting requirements. If numerical-based water quality standards are

mentioned in any of these and other related permits, testing and sampling may be required. Streams included on the 303(d) list by the SWRCB because of sediment, silt, or turbidity impairment are required to conduct sampling to verify that there is no net increase in sediment load due to construction activities.

Standards and Specifications

Planning

Proper planning, design, and construction techniques can minimize impacts normally associated with in-stream construction activities. Poor planning can adversely affect soil, fish, and wildlife resources, land uses, or land users. Planning should take into account: scheduling, avoidance of in-stream construction; minimizing disturbance area and construction time period; using pre-disturbed areas; selecting crossing location; selecting equipment and proper stabilization techniques once the activity is completed.

Scheduling (SS-1)

Construction activities should be scheduled according to the relative sensitivity of the environmental concerns and in accordance with SS-1, “Scheduling.” Scheduling considerations will be different when working near perennial streams vs. ephemeral streams, and are as follows:

- Construction work near perennial streams should optimally be performed during the dry season (see below).
- When working in or near ephemeral, intermittent, or perennial streams, construction should be performed during the dry season and in accordance with regulatory agency permits and approvals. By their very nature, ephemeral and intermittent streams are usually dry in the summer, and therefore, in-stream construction activities will not cause significant water quality problems. For perennial streams, clear water diversion (see NS-5 for “Clear Water Diversion”), dewatering (see NS-2 for “Dewatering Operations”), and water quality monitoring may be required.
- When closing the site at the end of the job, wash any fines that were formed in-situ back into the channel the bed material, to decrease pollution from the first rainstorm (“first flush”) of the season. When working near stream channels, erosion and sediment controls (see silt fences, straw bale barriers, etc.) should be implemented on the banks to keep sediment out of the stream channel.
- Regulatory permits might require or allow for the stockpiling of native bed material to be backfilled during stabilization.

Minimize Disturbance

Minimize disturbance through: selection of the narrowest crossing location; limiting the number of equipment trips across a stream during construction; and, minimizing the number and size of work areas (equipment staging areas and spoil storage areas). Provide stabilized access to the stream when in-stream work is required. Field reconnaissance should be conducted during the planning stage to identify work areas.

Comply with regulatory permit requirements, if none are applicable, then place work areas (stage area, active construction) at least 50 ft from the stream channel. Perform each of the following activities at least 100 feet

from a drainage course if it is performed within the floodplain, or at least 50 feet outside the floodplain: stockpiling materials, storing pile-driving equipment and liquid waste containers, washing vehicles and equipment, fueling and maintaining vehicles and equipment.

Locate access and staging areas in paved or pre-disturbed areas when possible. If not possible, select access and staging areas that minimizes disturbance to aquatic species, riparian vegetation, and habitat.

Avoid steep and unstable banks, highly erodible or saturated soils, or highly fractured rock, wherever possible.

Select equipment that reduces the amount of pressure exerted on the ground surface, and therefore, reduces erosion potential and/or use overhead or aerial access for transporting equipment across drainage channels. Use equipment that exerts ground pressures of less than 5 or 6 pounds per square inch (PSI), where possible. Low ground pressure equipment includes: wide or high flotation tires (34 to 72 inch wide); dual tires; bogie axle systems; tracked machines; lightweight equipment; and central tire inflation systems.

Streambank Stabilization: Preservation of Existing Vegetation (SS-2)

Preserve existing vegetation in accordance with SS-2, “Preservation of Existing Vegetation.” In a streambank environment preservation of existing vegetation provides the following benefits:

Water Quality Protection

Vegetated buffers on slopes trap sediment and promote groundwater recharge. The buffer width needed to maintain water quality ranges from 15 to 100 feet. On gradual slopes, most of the filtering occurs within the first 30 feet of the buffer. Steeper slopes require a greater width of vegetative buffer to provide water quality benefits.

Streambank Stabilization

The root system of riparian vegetation stabilizes streambanks by increasing tensile strength in the soil. The presence of vegetation modifies the moisture condition of slopes (infiltration, evapotranspiration, interception) and increases bank stability.

Riparian Habitat

Buffers of diverse riparian vegetation provide food, shelter, and shade for riparian and aquatic organisms. Minimizing impacts to fisheries habitat is a major concern when working near streams and rivers. Riparian vegetation provides shade, shelter, organic matter (leaf detritus and large woody debris), and other nutrients that are necessary for fish and other aquatic organisms. Buffer widths for habitat concerns are typically wider than those recommended for water quality concerns (100 to 1,500 feet).

When working near watercourses, it is important to understand the work site’s placement in the watershed. Riparian vegetation in the headwater streams has a greater impact on overall water quality than vegetation in downstream reaches. Preserving existing vegetation in upstream areas is necessary to maintain water quality, minimize bank failure, and maximize riparian habitat downstream of the work site.



Local county and municipal ordinances regarding width, extent and type of vegetative buffer required may exceed the specifications provided here; these ordinances should be investigated prior to construction.

As a general rule, the width of a buffer strip between a road and the stream is recommended to be 50 feet plus four times the percent slope of the land, measured between the road and the top of stream bank.

Hydraulic Mulch (SS-3), Hydroseeding (SS-4), and Soil Binders (SS-5)

Apply hydraulic mulch, hydroseed, or soil binders on disturbed streambanks above the mean high water level to provide temporary soil stabilization.

Do not place hydraulic mulch, tackifiers, fertilizers, or soil binders below the mean high water level, as these materials could wash into the channel and impact water quality or possibly cause eutrophication.

Straw Mulch (SS-6)

Apply straw mulch to disturbed streambanks in accordance with SS-6, “Straw Mulch.”

Do not place straw mulch or tackifiers below the mean high water level, as this material could wash into the channel and impact water quality.

Earth Dikes/Drainage Swales, and Lined Ditches (SS-9)

Convey, intercept, or divert runoff from disturbed streambanks using SS-9, “Earth Dikes/Drainage Swales, and Lined Ditches.”

Do not place earth dikes in watercourses, as these structures are only suited for intercepting sheet flow, and should not be used to intercept concentrated flow.

Outlet Protection/Velocity Dissipation Devices (SS-10)

Place outlet protection or velocity dissipation devices at outlets of pipes, drains, culverts, slope drains, diversion ditches, swales, conduits or channels in accordance with SS-10.

Slope Drains (SS-11)

Use slope drains to intercept and direct surface runoff or groundwater into a stabilized watercourse, trapping device or stabilized area in accordance with SS-11, “Slope Drains.” The use of slope drains minimizes potential streambank erosion from overland flows.

Streambank Sediment Control: Silt Fences (SC-1)

Install silt fences in accordance with SC-1, “Silt Fence” to control sediment. Silt fences should only be installed where sediment-laden water can pond, thus allowing the sediment to settle out.

Fiber Rolls (SC-5)

Install fiber rolls in accordance with SC-5, “Fiber Rolls” along slope contour above the high water level to intercept runoff, reduce flow velocity, release the runoff as sheet flow and provide removal of sediment from the runoff. In a stream environment, fiber rolls should be used in conjunction with other sediment control



methods such as SC-1, “Silt Fence” or SC-9, “Straw Bale Barrier.” Install silt fence, straw bale barrier, or other erosion control methods along the toe of slope above the high water level. Typical fiber roll installation is illustrated at the end of this Section.

Gravel Bag Berm (SC-6)

A gravel bag berm or barrier can be utilized to intercept and slow the flow of sediment-laden sheet flow runoff in accordance with SC-6, “Gravel Bag Berm.” In a stream environment gravel bag barriers can allow sediment to settle from runoff before water leaves the construction site and can be used to isolate the work area from the stream. Gravel bag barriers are not recommended as a perimeter sediment control practice around streams.

Straw Bale Barrier (SC-9)

Install straw bale barriers in accordance with SC-9, “Straw Bale Barrier” to control sediment. Straw bale barriers should only be installed where sediment-laden water can pond, thus allowing the sediment to settle out. Install a silt fence in accordance with SC-1, “Silt Fence” on the down-slope side of the straw bale barrier closest to stream channel to provide added sediment control.

Compost Stock (SC-8)

Compost socks are a mesh sock containing compost that act as three dimensional, biodegradable structures that intercept and filter sheet flow. Compost socks can filter runoff, retain sediment, and reduce sheet flow velocities. Compost may be pre-seeded to assist in the establishment of vegetation. Compost socks may be used as either a temporary or permanent sediment control measure.

Maintenance and Inspection

Inspect BMPs daily during construction.

Maintain and repair BMPs.

Remove accumulated sediment as necessary.

SWPPP or WPCP

Streambank Stabilization must be discussed in Section 500.3.2 of the SWPPP or Section 30.2 of the WPCP.

Section 4

Temporary Sediment Control BMP

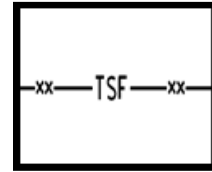
4.1 Temporary Sediment Controls

Temporary sediment control practices include those practices that intercept and slow or detain the flow of stormwater to allow sediment to settle and be trapped. These practices can consist of installing temporary linear sediment barriers (such as silt fences, sandbag barriers, and straw bale barriers); providing fiber rolls, gravel bag berms, or check dams to break up slope length or flow; or constructing a temporary sediment/desilting basin on sediment trap. Linear sediment barriers are typically placed below the toe of exposed and erodible slopes, downslope of exposed soil areas, around temporary stockpiles, and at other appropriate locations along the site perimeter.

Temporary sediment control practices must be implemented in conformance with the criteria presented in Section 2 of this Manual and the SWPPP/WPCP Preparation Manual. Temporary sediment control practices include the BMPs listed in Table 4-1.

Table 4-1. Temporary Sediment Control BMPs	
ID	BMP Name
SC-1	Silt Fence
SC-2	Sediment/Desilting Basin
SC-3	Sediment Trap/Curb Cutback
SC-4	Check Dam
SC-5	Fiber Rolls
SC-6	Gravel Bag Berm/Earthen Berm
SC-7	Street Sweeping
SC-8	Sandbag Barrier
SC-9	Straw Bale Barrier
SC-10	Temporary Drainage Inlet Protection
SC-11	Compost Sock
SC-12	Flexible Sediment Barrier

The remainder of this Section describe the working details for each of the temporary sediment control BMPs.



Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☒
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

A silt fence is a temporary linear sediment barrier of permeable fabric designed to intercept and slow the flow of sediment-laden sheet flow runoff. Silt fences allow sediment to settle from runoff before water leaves the construction site.

Appropriate Applications

Below the toe of exposed and erodible slopes.

Down-slope of exposed soil areas.

Around temporary stockpiles.

Along streams and channels.

Along the perimeter of a project.

Limitations

Not effective unless trenched and keyed in.

Not intended for use as mid-slope protection on slopes greater than 4:1 (H:V).

Must be maintained.

Must be removed and disposed of.

Don't use below slopes subject to creep, slumping, or landslides.

Don't use in streams, channels, drain inlets, or anywhere flow is concentrated.

Don't use silt fences to divert flow.

Don't use in locations where ponded water may cause a flooding hazard.

Standards and Specifications

Design and Layout

The drainage area above any fence should not exceed a quarter of an acre, (100-feet of silt fence per 10,000 square feet of DSA).

Slope of area draining to silt fence should be less than 1:1 (H:V).

Silt fences must be placed parallel to the slope contour.

Silt fences rely on temporary ponding to encourage sediment deposition and achieve water quality benefits. Limit application to areas where ponding and deposition may occur on the uphill side of the silt fence.

Temporary silt fence fabrics generally have life spans ranging between five and eight months. Projects with longer durations may require replacing silt fence fabric.

Silt fences constructed across concentrated flows are susceptible to washout. Silt fences shall not be installed across concentrated flows.

For slopes adjacent to water bodies or Environmentally Sensitive Areas (ESAs), additional temporary soil stabilization BMPs should be used.

For any 50 foot section of silt fence, the elevation of the base of the fence may not vary by more than 1/3 of the fence height.

Install along a level contour, so water does not pond more than 1.5 ft at any point along the silt fence.

Join separate sections to form reaches not more than 500 feet without openings. Ensure there are no gaps between posts.

Reinforced Silt Fence

Temporary reinforced silt fence is typically used in areas affected by high winds. They are also often used on slopes steeper than 2:1 (H:V) that contain a high number of rocks or large dirt clods that tend to dislodge, or where area draining fence contains moderate sediment loads.

Temporary reinforced silt fence (type 2) may also be used to provide sediment control and delineate ESAs.

Materials

Silt fence fabric should be a woven or unwoven geosynthetic textile that complies with Section 96-1.02E of the Standard Specifications. The Contractor must submit a certificate of compliance for silt fence fabric in accordance with Standard Specifications Section 6-2.03C.

Wood posts should be untreated fir, redwood, cedar, or pine lumber. Each silt fence post should be at least 4 feet long, except reinforced silt fence posts should be at least 6 feet for Type 1 and 5 feet for Type 2 installations. Posts should be free from decay, splits or cracks longer than the thickness of the post or other defects that would weaken the posts and cause the posts to be structurally unsuitable. Steel posts may be used as well. Posts should comply with the requirements in Standard Specifications sections 16-2.03B and 13-10.02C.

Anchors may be used. Anchors consist of a number 4 steel reinforcing bar. End protection shall be provided for any exposed bar reinforcement.

Staples used to fasten the fence fabric to the posts and to join adjacent silt fence sections shall be U-shaped and have 1/2-inch legs and a 1-inch crown. Staples should be 1/16-inch in diameter. At least four staples should be installed on each silt fence post for adequate fastening, with a maximum of 8-inches between each staple.

Installation

Install in accordance with Pages 5 and 6 of this BMP (Standard Plans T51 “Temporary Silt Fence” and T60 “Temporary Reinforced Silt Fence”).

Generally, silt fences should be used in conjunction with soil stabilization source controls up slope to provide effective erosion and sediment control.

Excavate a trench that is 6-inches deep and 6-inches wide with a length consistent with the project design plans. Place the bottom of the silt fence fabric in the trench. Backfill the trench with soil over the base of the silt fence fabric. Compact the backfill soil by hand or mechanical methods.

Construct the length of each reach so that the change in base elevation along any 50-foot reach does not exceed 1/3 the height of the barrier; in no case should any reach of temporary silt fence exceed 500 feet in length.

Construct silt fences with a set-back of at least 3 feet from the toe of a slope. Where a silt fence is determined to be not practical with a 3 foot set-back from the toe due to specific site conditions, the silt fence may be constructed at the toe of the slope, but should be constructed as far from the toe of the slope as practical.

Maintenance and Inspection

Repair undercut silt fences.

Repair or replace split, torn, slumping, or weathered fabric.

Inspect silt fence when rain is forecast. Perform necessary maintenance, or maintenance required by the Engineer.

Inspect silt fence following rain events. Perform maintenance as necessary, or as required by the Engineer.

Maintain silt fences to provide an adequate sediment holding capacity. Sediment should be removed when the sediment accumulation reaches one-third (1/3) of the barrier height.

Silt fences that are damaged and become unsuitable for the intended purpose should be removed from the site of work, disposed of outside the highway right of way in conformance with the Standard Specifications, and replaced with new silt fence barriers.

Holes, depressions or other ground disturbance caused by the removal of the temporary silt fences should be backfilled and repaired in conformance with the Standard Specifications.

Remove silt fence when no longer needed. Fill and compact post holes and anchorage trench, remove sediment accumulation, and grade fence alignment to blend with adjacent ground.

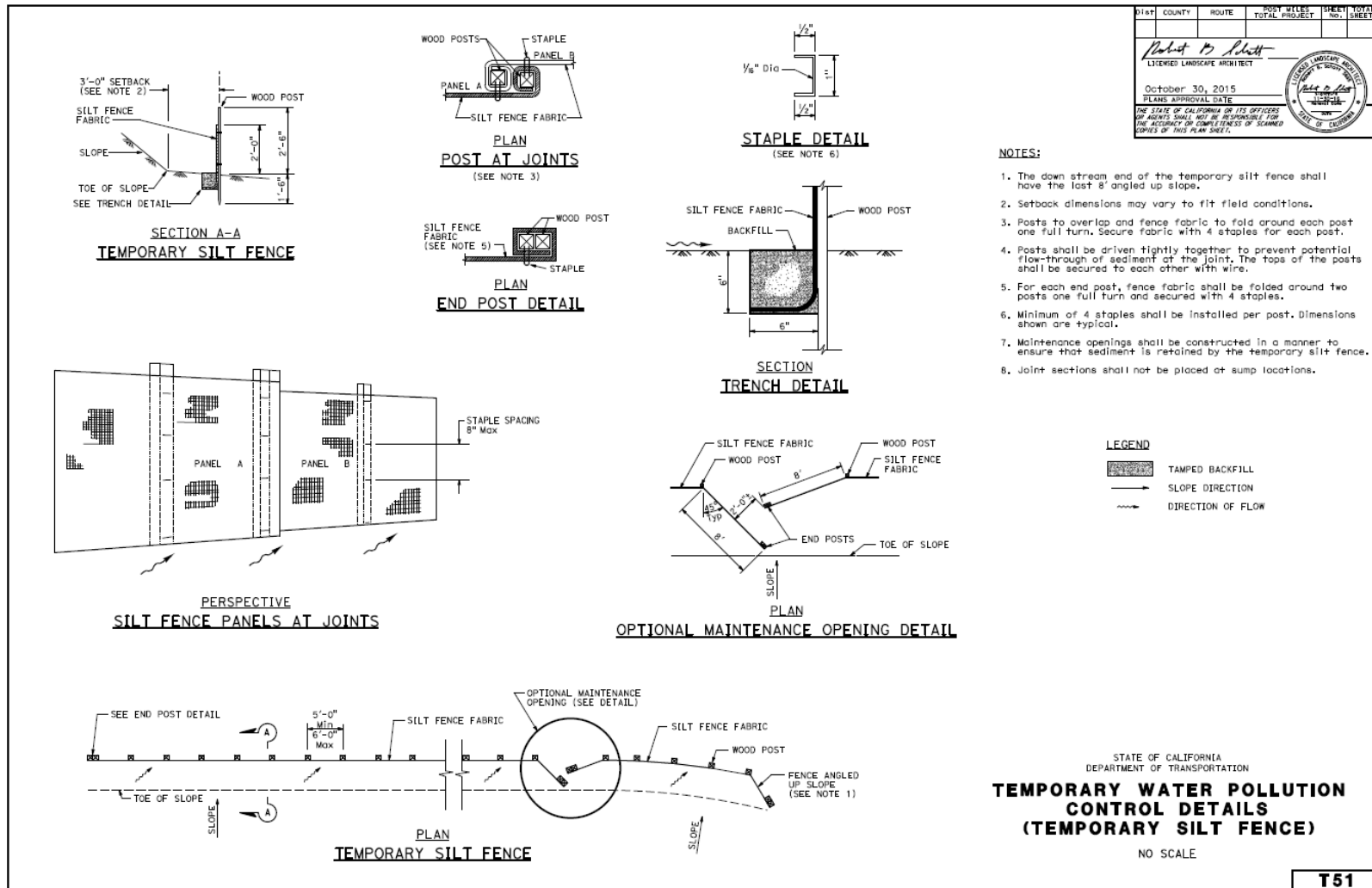
Silt Fence placement is to be shown in the WPCDs along with other BMPs.

SWPPP or WPCP

Temporary Silt Fence or Reinforced Silt Fence must be discussed in Section 500.3.3 of the SWPPP or Section 30.2.2 of the WPCP.

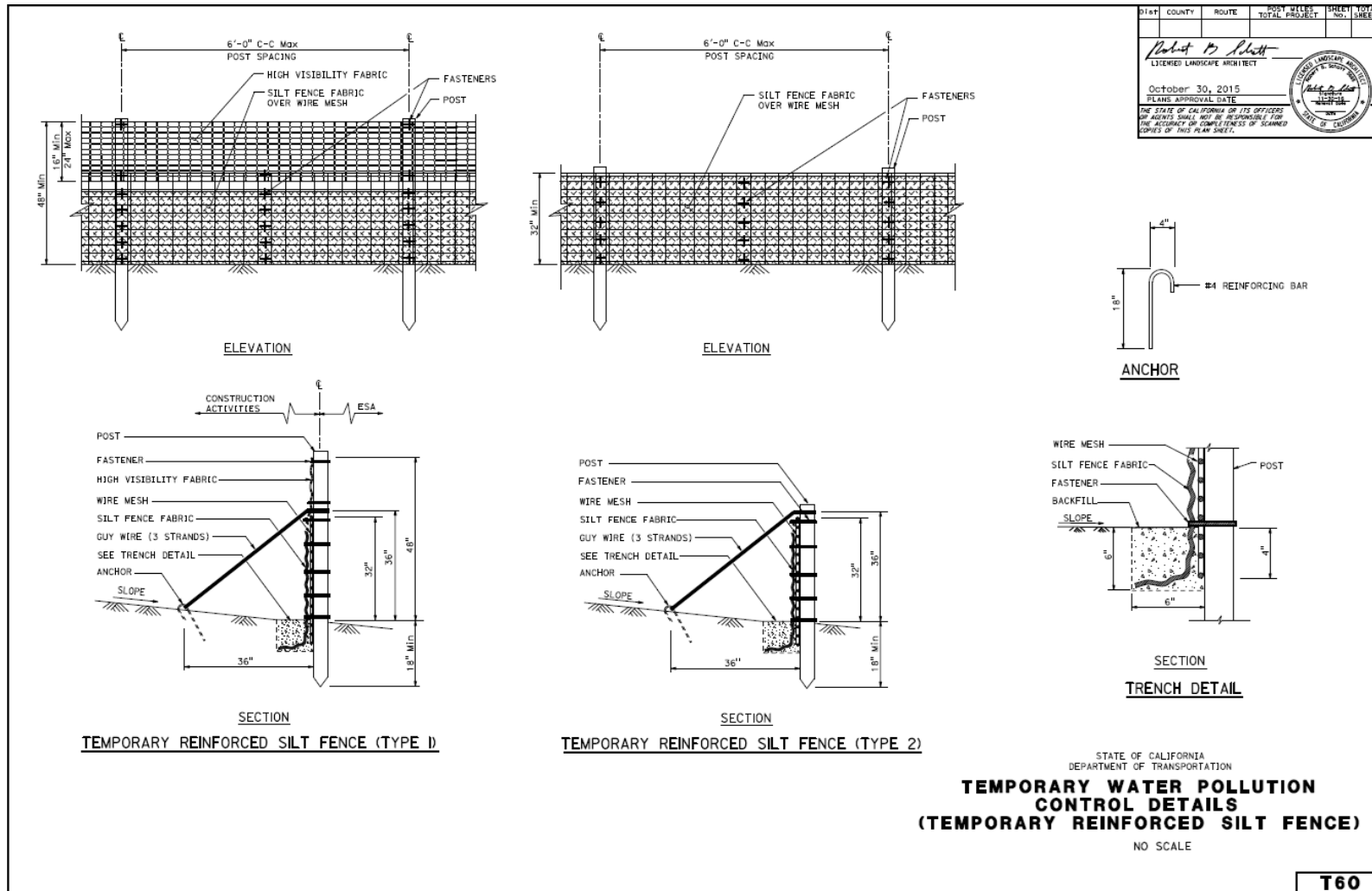
Temporary Silt Fence

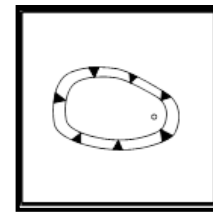
SC-1



Temporary Silt Fence

SC-1





Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☒
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

A sediment/desilting basin is a temporary basin formed by excavating and/or constructing an embankment so that sediment-laden runoff is temporarily detained under quiescent conditions, allowing sediment to settle out before the runoff is discharged (refer to Figures 1 through 4).

Appropriate Applications

Sediment basins shall be designed in accordance with the State of California NPDES General Permit for Storm Water Discharges Associated with Construction Activities (CGP). If there is insufficient area to construct a sediment basin in accordance with the CGP requirements, then the alternate desilting design standards specified herein may be used as approved by the RE.

Sediment/Desilting Basins should be considered for use:

- On construction projects with disturbed areas during the wetter months, typically October through May.
- Where sediment-laden water may enter the drainage system or watercourses.
- At drainage outlets of disturbed soil areas with areas between 5 and 10 ac.

Limitations

Alternative BMPs must be thoroughly investigated for erosion control before selecting temporary sediment/desilting basins.

Requires large surface areas to permit settling of sediment.

Size may be limited by availability of right-of-way.



Not appropriate for drainage areas greater than 75 ac.

Not to be located in live streams.

For safety reasons, basins should have protective fencing.

Not to be used as a standalone BMP, requires proper BMP implementation upstream and downstream of its location.

Standards and Specifications

General Requirements

Sediment basins should be designed in accordance with the methods referenced in the State of California NPDES General Permit for Storm Water Discharges Associated with Construction Activities (CGP).

Areas under embankments, structural works, and sediment basin must be cleared, stripped of vegetation in accordance with Standard Specifications Section 16 – “Temporary Facilities.”

Earthwork should be in accordance with Standard Specifications Section 19 – “Earthwork.” Contractor is specifically directed to Standard Specifications Sections 19 5, “Compaction,” and 19 6, “Embankment Construction.”

Chain link fencing should be provided around each sediment basin to prevent unauthorized entry to the basin or if safety is a concern. Fencing should be in accordance with Standard Specifications Section 80 – “Fences.”

This BMP may be implemented on a project-by-project basis with other BMPs when determined necessary and feasible by the RE.

The outflow from the basins must have outlet protection to prevent erosion and scouring of the embankment and channel. See BMP SS-10, “Outlet Protection/Velocity Dissipation Devices.”

Avoid dewatering of groundwater to the sediment basin during the wetter months. Insignificant quantities of accumulated precipitation may be dewatered to the sediment basin unless precipitation is forecasted within 24 hours. Refer to NS-2 “Dewatering Operations.”

Other Considerations

Basin should be located: (1) by excavating a suitable area or where a low embankment can be constructed across a swale, (2) where post-construction (permanent) detention basins will be constructed, (3) where failure would not cause loss of life or property damage, (4) where the basins can be maintained on a year-round basis to provide access for maintenance, including sediment removal and sediment stockpiling in a protected area, and to maintain the basin to provide the required capacity.

Construct sediment basins prior to the rainy season and construction activities.

Sediment basins, regardless of size and storage volume, should include features to accommodate overflow or bypass flows that exceed the design storm event. The calculated basin volume and proposed location should be submitted to the RE for approval at least 3 days prior to the basin construction.

Construct an emergency spillway to accommodate flows not carried by the principal spillway. Spillway should consist of an open channel (earthen or vegetated) over undisturbed material (not fill) or constructed of a non-erodible rock slope protection.

The spillway control section, which is a level portion of the spillway channel at the highest elevation in the channel, should be a minimum of 20 ft in length.

Limit the contributing area to the sediment basin to only the runoff from disturbed soil areas. Use temporary concentrated flow conveyance controls to divert runoff from undisturbed areas away from the sediment basin.

A forebay, constructed upstream of the basin may be provided to allow debris and larger particles to settle out of suspension before entering the basin.

Basin inlets should be located to maximize travel distance to the basin outlet and resulting sediment deposition benefits.

Rock or vegetation should be used to protect the basin inlet and slopes against erosion.

The outlet structure should be placed on a firm, smooth foundation with the base securely anchored with concrete or other means to prevent floatation.

Discharge from the basin should be accomplished through a water quality outlet. An example is shown in Figure 3. The principal outlet should consist of a corrugated metal, high density polyethylene (HDPE), or reinforced concrete riser pipe with dewatering holes and an anti-vortex device and trash rack attached to the top of the riser, to prevent floating debris from flowing out of the basin or obstructing the system. This principal structure should be designed to accommodate the inflow design storm.

A rock pile or rock-filled gabions can serve as alternatives to the debris screen, although the designer should be aware of the potential for extra maintenance involved should the pore spaces in the rock pile clog.

Proper hydraulic design of the outlet is critical to achieving the desired performance of the basin. The water quality outlet should be designed to drain the basin within 24 to 96 hours (also referred to as “drawdown time”). (The 24-hour limit is specified to provide adequate settling time; the 96-hour limit is specified to avoid vector control concerns). Local agencies may have more stringent drawdown time requirements.

The two most common outlet problems that occur are: (1) the capacity of the outlet is too great resulting in only partial filling of the basin and drawdown time less than designed for; and (2) the outlet clogs because it is not adequately protected against trash and debris. To avoid these problems, the following outlet types are recommended for use: (1) a single orifice outlet with or without the protection of a riser pipe, and (2) perforated riser. Design guidance for single orifice and perforated riser outlets are as follows:

Flow Control Using a Single Orifice at the Bottom of the Basin (Figure 1)

The outlet control orifice should be sized using the following equation:

$$a = \frac{2A(H - H_o)^{0.5}}{3600CT(2g)^{0.5}} = \frac{(7 \times 10^{-5})A(H - H_o)^{0.5}}{CT} \quad (\text{Eq. 2})$$

Where:

- a = area of orifice (ft²) (1 ft² = 0.0929m²)
- A = surface area of the basin at mid elevation (ft²)
- C = orifice coefficient
- T = drawdown time of full basin (hrs)
- G = gravity (32.2 ft/s²)
- H = elevation when the basin is full (ft)
- H_o = final elevation when basin is empty (ft)

With a drawdown time of 40 hours, the equation becomes:

$$a = \frac{(1.75 \times 10^{-6})A(H - H_o)^{0.5}}{C} \quad (\text{Eq. 3})$$

Flow Control Using Multiple Orifices (See Figure 2)

$$a_t = \frac{2A(h_{\max})}{CT(2g[h_{\max} - h_{\text{centroid of orifices}}])^{0.5}} \quad (\text{Eq. 4})$$

With terms as described above except:

- a_t = total area of orifices
- $h_{\max}$ = maximum height from lowest orifice to the maximum water surface (ft)
- $h_{\text{centroid of orifices}}$ = height from the lowest orifice to the centroid of the orifice configuration (ft)

Allocate the orifices evenly on two rows; separate the holes by 3x hole diameter vertically, and by 120 degrees horizontally (refer to Figure 3).

Because basins are not maintained for infiltration, water loss by infiltration should be disregarded when designing the hydraulic capacity of the outlet structure.

Care must be taken in the selection of "C"; 0.60 is most often recommended and used. However, based on actual tests, GKY (1989), "Outlet Hydraulics of Extended Detention Facilities for Northern Virginia Planning District Commission", recommends the following:

C = 0.66 for thin materials; where the thickness is equal to or less than the orifice diameter, or

$C = 0.80$ when the material is thicker than the orifice diameter

The Contractor should verify that the outlet is properly designed to handle the design and peak flows.

If rock is used for energy dissipation or to prevent erosion, it must comply with Highway Design Manual Chapter 860.

Attach riser pipe (watertight connection) to a horizontal pipe (barrel), which extends through the embankment to toe of fill. Provide anti-seep collars on the barrel.

Cleanout level should be clearly marked on the riser pipe.

Basins with an impounding levee greater than 5 ft tall, measured from the lowest point to the impounding area to the highest point of the levee, and basins capable of impounding more than 35,300 cubic feet, should be designed by a professional Civil Engineer registered with the state of California. The design must be submitted to the RE for approval at least 7 days prior to the basin construction. The design should include maintenance requirements, including sediment and vegetation removal, to ensure continuous function of the basin outlet and bypass structures.

Maintenance and Inspection

Inspect sediment basins before and after rainfall events and weekly year round. During extended rainfall events, inspect at least every 24 hours.

Examine basin banks for seepage and structural soundness.

Check inlet and outlet structures and spillway for any damage or obstructions. Repair damage and remove obstructions as needed.

Remove standing water from the basin within 72 hours after accumulation.

Check inlet and outlet area for erosion and stabilize if required.

Remove accumulated sediment when its volume reaches one-third the volume of the sediment storage. Properly dispose of sediment and debris removed from the basin.

Check fencing for damage and repair.

SWPPP or WPCP

Sediment/Desilting Basin must be discussed in Section 500.3.3 of the SWPPP or Section 30.2.2 of the WPCP.

Other

The drawings on subsequent pages were sourced from CASQA.



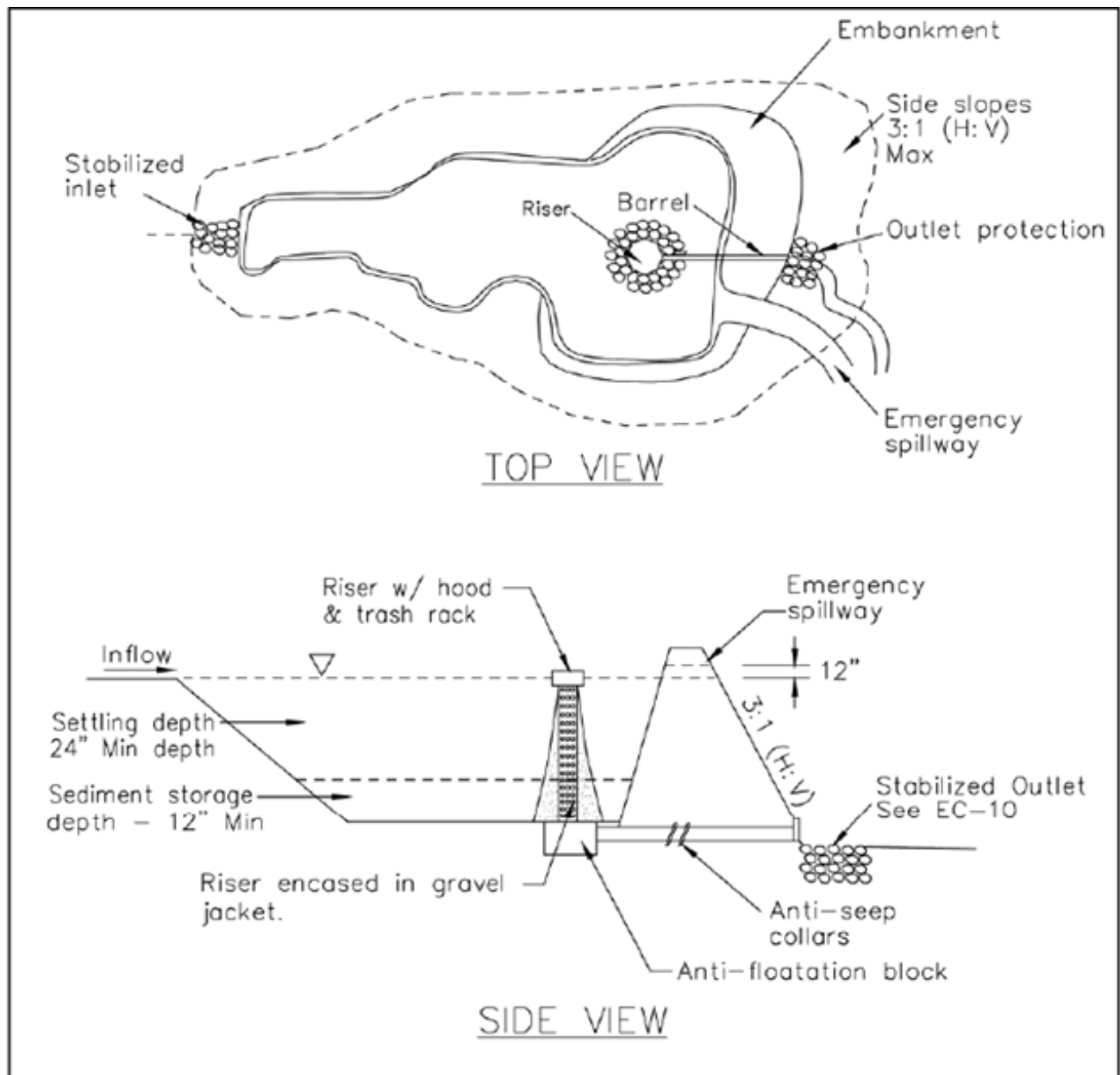
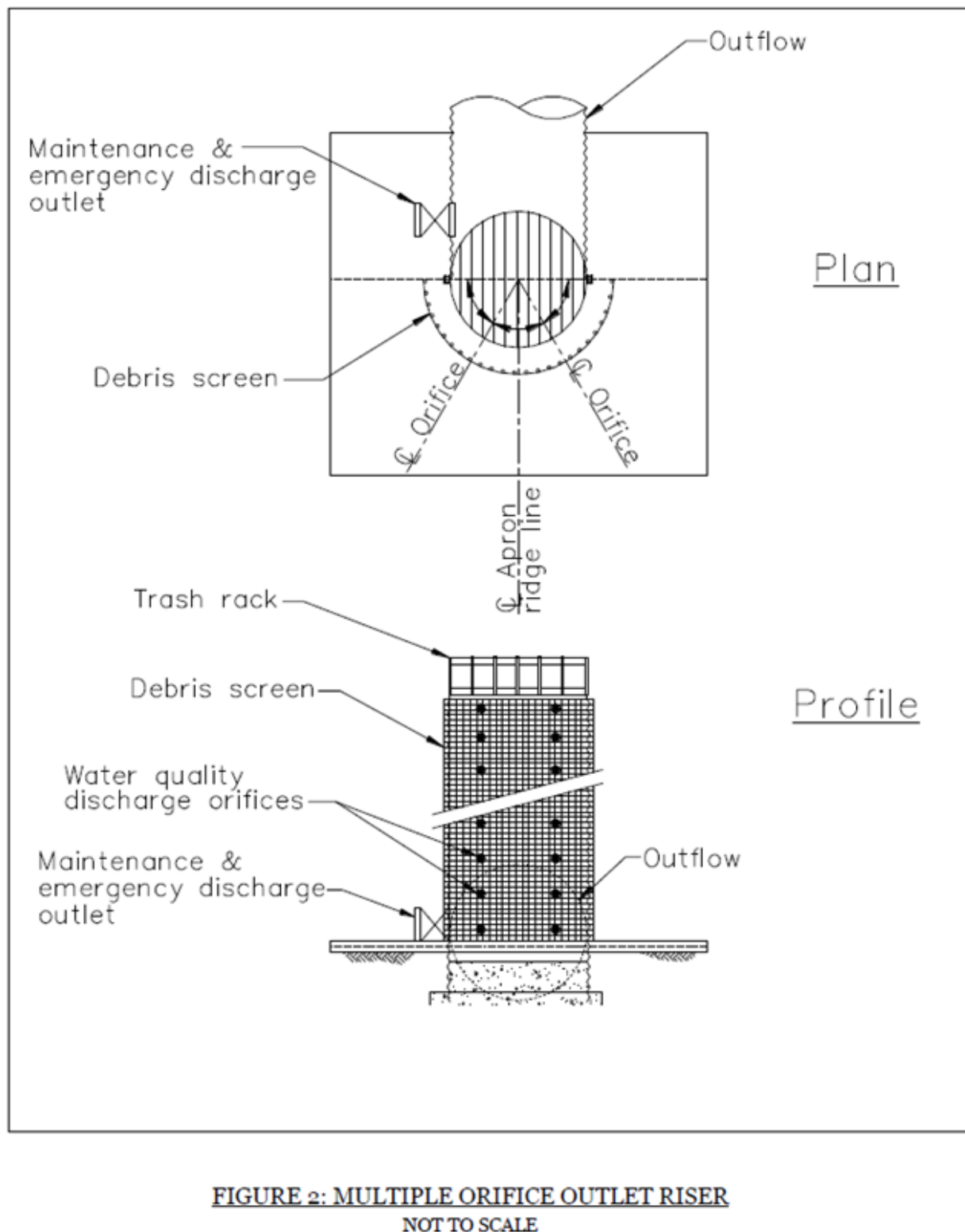
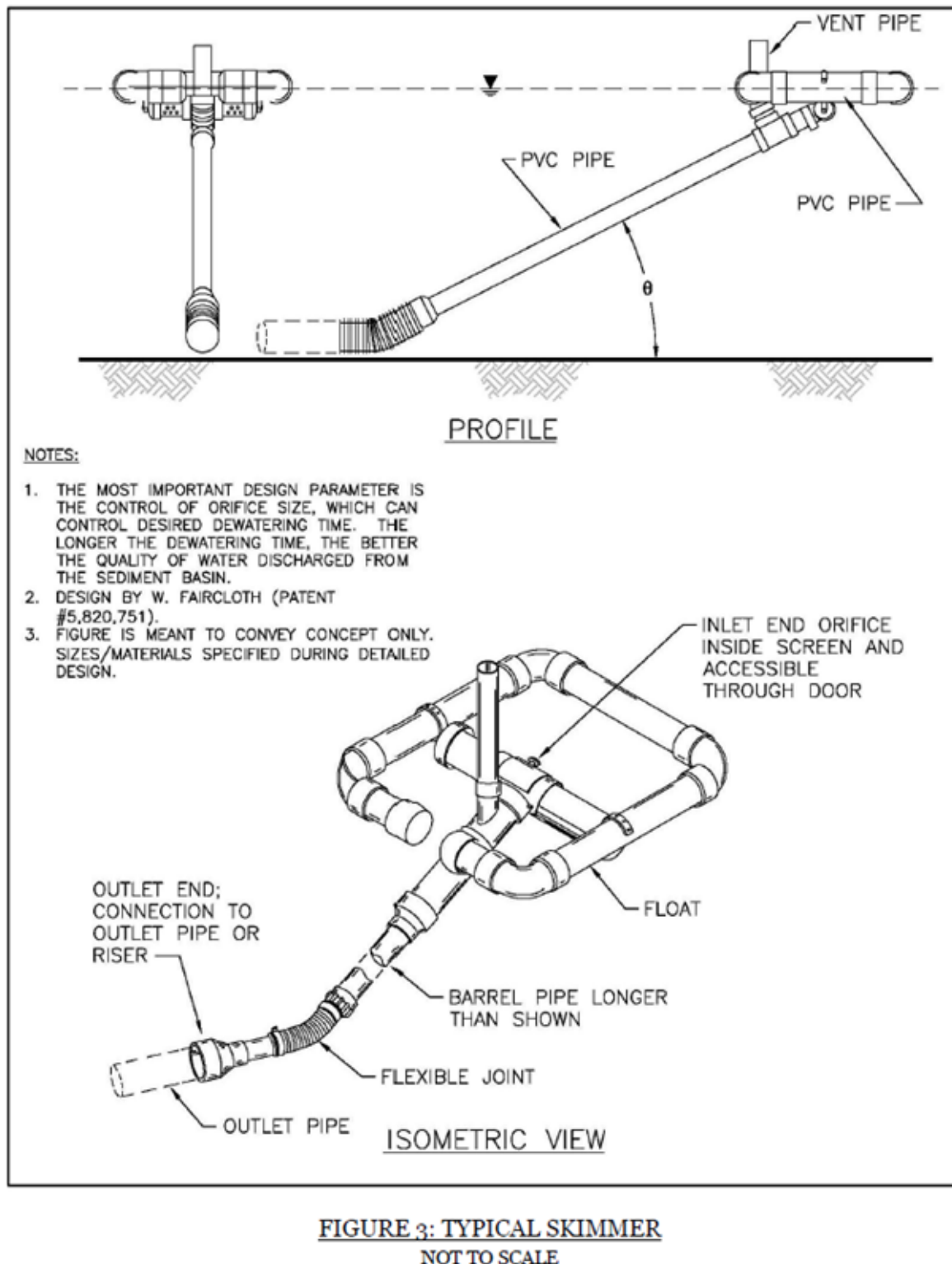


**FIGURE 1: TYPICAL TEMPORARY SEDIMENT BASIN
MULTIPLE ORIFICE DESIGN
NOT TO SCALE**





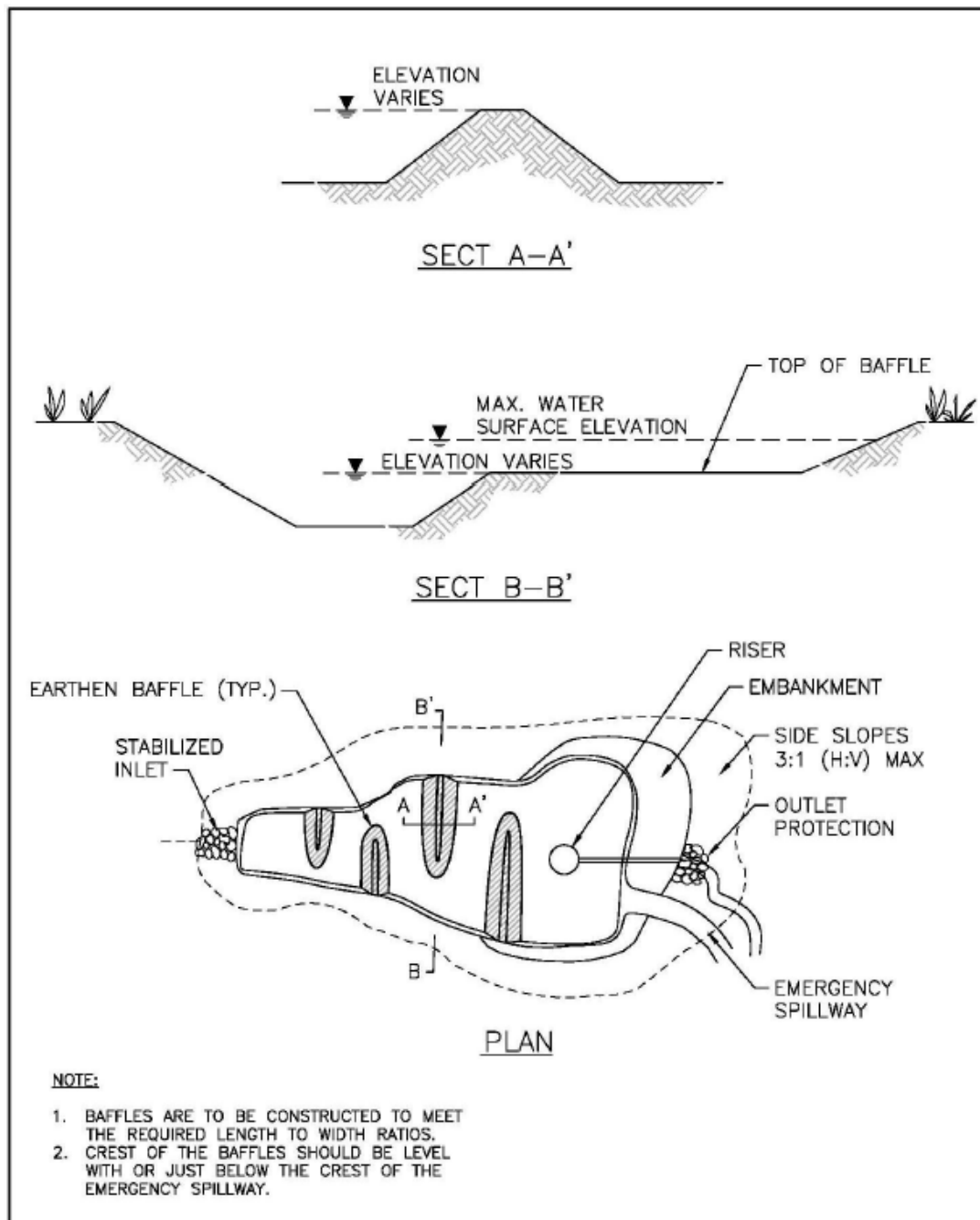
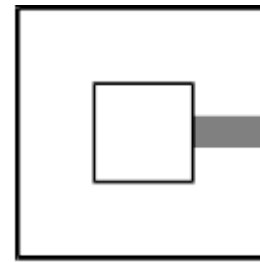


**FIGURE 4: TYPICAL TEMPORARY SEDIMENT BASIN
WITH BAFFLES
NOT TO SCALE**

Temporary Sediment Trap/Curb Cutback

SC-3



Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☒
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

A sediment trap/curb cutback is a temporary containment area that allows sediment in collected storm water to settle out during infiltration or before the runoff is discharged through a stabilized spillway. Sediment traps are formed by excavating or constructing an earthen embankment.

Curb cutback is implemented when the construction project utilizes the removed section of pavement and uses the depression of the curb as a temporary containment to collect sediment before reaching a storm drain.

Appropriate Applications

Sediment traps may be used on construction projects where the drainage area is less than 5 ac. Traps should be placed where sediment-laden stormwater enters a storm drain or watercourse.

As a supplemental control, sediment traps provide additional protection for a water body or for reducing sediment before it enters a drainage system.

Limitations

Requires large surface areas to permit infiltration and settling of sediment.

Size may be limited by availability of right-of-way.

Not appropriate for drainage areas greater than 5 ac.



Temporary Sediment Trap/Curb Cutback

SC-3

Only removes large and medium sized particles and requires upstream erosion control.

Sediment traps may appear attractive and dangerous to children, requiring protective fencing.

Sediment traps should not be located in live streams.

Curb cutback typically does not allow for a large storage area and therefore requires frequent maintenance to prevent sediment laden discharges.

Standards and Specifications

General Requirements

Areas under embankments, structural works, and sediment traps must be cleared and stripped of vegetation in accordance with Standard Specifications Section 17-2 – “Clearing and Grubbing.”

Earthwork must be in accordance with Standard Specifications Section 19 – “Earthwork”. Contractor is specifically directed to Standard Specifications Sections 19 5 and 19 6 entitled, “Compaction” and “Embankment Construction,” respectively.

Fencing, in accordance with Standard Specifications Section 80 – “Fences,” should be provided to prevent unauthorized entry.

Remove and dispose of deposited solids from sediment traps under Standard Specifications Section 14-10 – “Solid Waste Disposal and Recycling,” unless another method is authorized.

This BMP may be implemented on a project-by-project basis with other BMPs when determined necessary and feasible by the RE.

The outflow from sediment traps may be provided with outlet protection to prevent erosion and scouring of the embankment and channel. See BMP SS-10, “Outlet Protection/Velocity Dissipation Devices.”

For curb cutback, excavate soil from behind the curb, sidewalk, or roadway at least 3-4 inches down from the top of the hardscape and bring the soil back at a minimum 3-4 feet back from the hardscape. Site conditions might allow for increase in capacity.

Other Considerations

The sediment trap should be situated according to the following criteria: (1) by excavating a suitable area or where a low embankment can be constructed across a swale, (2) where failure would not cause loss of life or property damage, and (3) to provide access for maintenance, including sediment removal and sediment stockpiling in a protected area.

Sediment traps should be sized to accommodate a settling zone and sediment storage zone with recommended minimum volumes of 67 yd³/ac and 33 yd³/ac of contributing drainage area, respectively, based on 0.5 inch



Temporary Sediment Trap/Curb Cutback

SC-3

of runoff volume over a 24-hour period. Multiple traps and/or additional volume may be required to accommodate site specific rainfall and soil conditions.

Use rock or vegetation to protect the trap outlets against erosion.

Traps with an impounding levee greater than 4.5 ft tall, measured from the lowest point to the impounding area to the highest point of the levee, and traps capable of impounding more than 35,000 cubic feet, must be designed by a Civil Engineer registered with the state of California. The design must be submitted to the RE for approval at least 7 days prior to the basin construction. The design should include maintenance requirements to ensure continuous function of the trap outlet and bypass structures.

Maintenance and Inspection

Inspect sediment traps/curbs before, during and after rainfall events and weekly year-round. During extended rainfall events, inspect sediment traps at least every 24 hours.

If captured runoff has not completely infiltrated within 96 hours, then the sediment trap must be dewatered.

Inspect trap banks for embankment seepage and structural soundness.

Inspect outlet structure and rock spillway for any damage or obstructions. Repair damage and remove obstructions as needed or as directed by the RE.

Inspect outlet area for erosion and stabilize if required, or as directed by the RE.

Remove accumulated sediment when the volume has reached one-third the original trap volume.

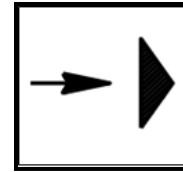
Inspect fencing for damage and repair as needed or as directed by the RE.

Temporary Sediment Trap/ Curb Cutback locations must be shown in the WPCDs along with other BMPs.

SWPPP or WPCP

Temporary Sediment Trap/ Curb Cutback must be discussed in Section 500.3.3 of the SWPPP or Section 30.2.2 of the WPCP.





Standard Symbol

BMP Objectives	
Soil Stabilization	☒
Sediment Control	☒
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

Temporary check dams reduce scour and channel erosion by reducing flow velocity and encouraging sediment settlement. A check dam is a small device constructed of rock, gravel bags, compost socks, fiber rolls, or other proprietary product placed across a natural or man-made channel or drainage ditch.

Appropriate Applications

Check dams may be installed:

- In small open channels that drain 10 ac or less.
- In steep channels where storm water runoff velocities exceed 5 ft/sec.
- During the establishment of grass linings in drainage ditches or channels.
- In temporary ditches where the short length of service does not warrant establishment of erosion-resistant linings.

This BMP may be implemented on a project-by-project basis with other BMPs when determined necessary and feasible by the RE.

Limitations

Not to be used in live streams.

Not appropriate in channels that drain areas greater than 10 ac.

Not to be placed in channels that are already grass lined unless erosion is expected, as installation may damage vegetation.

Require extensive maintenance following high velocity flows.

Promotes sediment trapping, which can be re-suspended during subsequent storms or removal of the check dam.

Not to be constructed from straw bales or silt fence.

Standards and Specifications

General Requirements

Remove obstructions, rocks, clods, and debris greater than 1 inch in diameter from the ground before installing temporary check dams.

If check dams are used in combination with Rolled Erosion Control Product (RECP) or blanket, install the RECP or blanket first.

Place a temporary check dam perpendicular to the centerline of the ditch or drainage line.

Install the check dam with enough spillway depth to prevent flanking of a concentrated flow around its ends.

Type 1 or Type 2 check dams are appropriate for unlined ditches. Type 2 check dams are appropriate if the ditch is concrete lined.

Fiber Roll (Type 1) Check Dam

Refer to SC-5 “Fiber Rolls.”

Secure the fiber rolls with rope and notched wood stakes.

Drive the stakes into the soil until the notch is even with the top of the fiber roll.

Lace rope between the stakes and over the fiber roll. Knot the rope at each stake.

Tighten by driving the stakes further into the soil and forcing the fiber roll against the surface of the ditch or drainage line.

Gravel Filled Bag (Type 2) Check Dam

Bag Material:

Bags are a geosynthetic material, either polypropylene, polyethylene or polyamide woven fabric, minimum unit weight 4 ounces per yd², mullen burst strength exceeding 300 psi in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70% in conformance with the requirements in ASTM designation D4355.

Bag Size:

Each gravel-filled bag should have a length of 24 in to 32 in, width of 16 in to 20 in, and thickness of 3 in. Alternative bag sizes must be submitted to the RE for approval prior to deployment.

Gravel:

Fill material is between 3/8 and 3/4 inch in diameter, and must be clean and free from clay balls, organic matter, and other deleterious materials. The opening of gravel-filled bags should be secured such that gravel does not escape. Gravel-filled bags are between 30 and 50 lb in weight. Fill material is subject to approval by the RE.

Place a Type 2 temporary check dam as a single layer of gravel-filled bags, placed end-to-end to eliminate gaps.

If you need to increase the height of the dam, add more layers of gravel-filled bags. Stack the bags in the upper row to overlap the joints in the lower row. Stabilize the rows by adding more rows of bags in the lower layers.

Tightly abut bags and stack gravel bags using a pyramid approach. Gravel bags should not be stacked any higher than 3 ft.

Upper rows of gravel bags should overlap joints in lower rows.

Other Considerations

Check dams should be placed at a distance and height to allow small pools to form behind them. Install the first check dam approximately 15 ft from the outfall device and at regular intervals based on slope gradient and soil type.

For multiple check dam installation, backwater from downstream check dam should reach the toe of the upstream dam.

High flows (typically a 2-year storm or larger) should safely flow over the check dam without an increase in upstream flooding or damage to the check dam.

Where grass is used to line ditches, check dams should be removed when grass has matured sufficiently to protect the ditch or swale from erosion.

Check dam materials should consist of biodegradable materials whenever feasible.

Rock check dams might be more applicable if concentrated flows might be a potential.

Maintenance and Inspection

Check dams must be inspected at a minimum weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

Replace missing rock, bags, fiber rolls, etc. that have degraded or become damaged.

Remove sediment when depth reaches one-third of the check dam height.

Remove accumulated sediment prior to permanent seeding or soil stabilization.

Remove check dam and accumulated sediment when check dams are no longer needed or when directed by the RE.

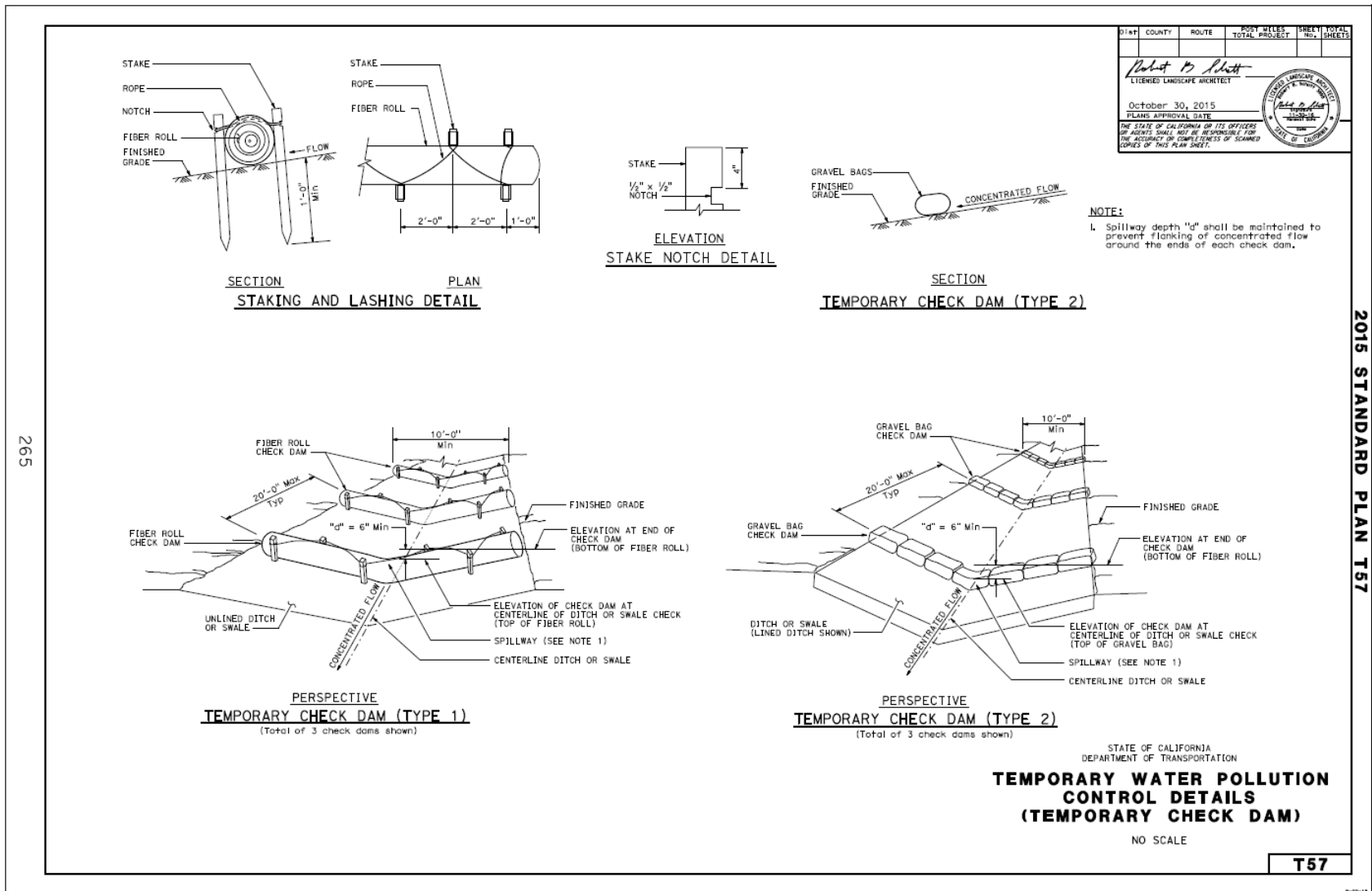
Removed sediment can be incorporated in the project at locations designated by the RE or disposed of outside the highway right of way in conformance with the Standard Specifications.

SWPPP or WPCP

Temporary Check Dams must be discussed in Section 500.3.3 of the SWPPP or Section 30.2.2 of the WPCP.

Check Dams

SC-4





Standard Symbol

BMP Objectives	
Soil Stabilization	☒
Sediment Control	☒
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

A fiber roll consists of wood excelsior, rice or wheat straw, or coconut fibers that is rolled or bound into a tight tubular roll and placed on the toe and face of slopes to intercept runoff, reduce its flow velocity, release the runoff as sheet flow and provide removal of sediment from the runoff. Fiber rolls may also be used for drainage inlet protection and as check dams under certain situations.

Appropriate Applications

This BMP may be implemented on a project-by-project basis with other BMPs when determined necessary and feasible by the RE.

Fiber rolls may be applied as both temporary and permanent sediment controls.

Along the toe, top, face, and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.

Below the toe of exposed and erodible slopes.

Fiber rolls may be used as check dams in unlined ditches or as temporary drainage inlet protection Down-slope of exposed soil areas.

Around temporary stockpiles.

Along the perimeter of a project.

Limitations

Runoff and erosion may occur if fiber roll is not adequately trenched in.

Fiber rolls at the toe of slopes greater than 5:1 (H:V) may require the use of a large sediment barrier as specified in Standard Specifications Section 13-10.03D Temporary Large Sediment Barrier or installations achieving the same protection (i.e., stacked smaller diameter fiber rolls, etc.).

Difficult to move once saturated.

Fiber rolls could be transported by high flows if not properly staked and trenched in.

Fiber rolls have limited sediment capture zone.

Do not use fiber rolls on slopes subject to creep, slumping, or landslide.

Plastic netting should not be used when regulatory permits prohibit their use or if there is a potential for plastic netting to endanger wildlife.

Plastic netting is only allowed where fiber rolls will be for short duration and will be removed.

Standards and Specifications

Materials

Fiber rolls must be premanufactured and filled with weed-free rice or wheat straw, wood excelsior, or coconut fiber. Fiber roll must be covered with biodegradable jute, sisal, or coir fiber netting secured tightly at each end.

Fiber rolls must have a minimum functional longevity of 1 year.

Fiber rolls must be:

- 8 to 10 inches in diameter and at least 1.1 lb/ft
- 10 to 12 inches in diameter and at least 3 lb/ft

Large sediment barriers are a subset of fiber rolls. Large sediment barriers must be:

- 18 to 22 inches in diameter
- At least 8 ft in length
- At least 6.5 lb/ft

Fiber rolls used within the jurisdiction of the Lahontan RWQCB must be made entirely of biodegradable materials if the project is near an ESA area, they are intended to be left in place after construction is completed or there are regulatory permits prohibiting the use of non-photo/biodegradable fiber rolls.

Submit a Certificate of Compliance for fiber rolls.

Rope to fasten fiber rolls must be 1/4 inch in diameter and biodegradable, such as sisal or manila.

Wood stakes must be untreated fir, redwood, cedar, or pine and cut from sound timber. The ends must be pointed for driving into the ground. Notched stakes must be at least 1 by 2 by 24 inches in size. Stakes without notches must be at least 1 by 1 by 24 inches.

Typical Fiber Roll Installation

Before installing fiber roll, remove obstructions from the ground, including rocks, clods, and debris greater than 1 inch in diameter.

For any 20-foot section of fiber roll, prevent the fiber roll from varying more than 5 percent from level.

Use the following spacing unless otherwise noted on the project plans or special provisions:

- 10 feet apart for slopes steeper than 2:1 (H:V)
- 15 feet apart for slopes from 2:1 to 4:1 (H:V)
- 20 feet apart for slopes from 4:1 to 10:1 (H:V)
- 50 feet apart for slopes flatter than 10:1 (H:V)

For Type 1 installations:

- Place in a furrow that is from 2 to 4 inches deep.
- Fasten with wood stakes every 4 feet along the length of the fiber roll.
- Fasten the ends of the fiber roll by placing a stake 6 inches from the end of the roll.
- Drive the stakes into the soil so the top of the stake is less than 2 inches above the top of the fiber roll.

For Type 2 installations:

- Fasten with notched wood stakes and rope.
- Drive stakes into the soil until the notch is even with the top of the fiber roll.
- Lace the rope between stakes and over the fiber roll. Knot the rope at each stake.
- Tighten the fiber roll to the surface of the slope by driving the stakes further into the soil.

If more than one fiber roll is placed in a row, the rolls should be overlapped; not abutted. Stagger overlapping joints in adjacent rows by 5 to 10 feet.

Typical Large Sediment Barrier Installation

Place a single row of fiber rolls end-to-end, approximately parallel with the slope contour. For any 20-foot section of fiber roll, do not allow the fiber roll to vary by more than 5 percent from level.

Place the fiber rolls in a furrow that is from 6 to 8 inches deep.

Secure the fiber rolls with wood stakes 4 feet apart.

Place a stake 18 inches from each end of each fiber roll.

Drive the stakes into the soil such that the top of the stakes are less than 2 inches above the top of the fiber rolls.

Angle the last 6 feet upslope at the downhill end of the run.

Removal

For permanent installations, do not remove fiber rolls. Fiber rolls will degrade over time, while underlying soils are stabilized by other BMPs.

For temporary installations, remove fiber rolls, collect and dispose of sediment accumulation, and fill and compact holes, trenches, depressions or any other ground disturbance to blend with adjacent ground.

Maintenance and Inspection

Remove sediment from behind the fiber roll if sediment is 1/3 of fiber roll height above ground.

Repair or adjust the fiber roll if rills or other evidence of concentrated runoff occur beneath the fiber roll.

Repair or replace the fiber roll if they become split, torn, or unraveled.

Add stakes if the fiber roll slumps or sags.

Replace broken or split wood stakes.

Remove sediment deposits, trash, and debris from fiber roll as needed. If removed sediment is deposited within project limits, it must be stabilized and not exposed to erosion by wind or water.

Perform maintenance as needed or as required by the RE or CGP or LTCGP requirements.

Inspect fiber rolls before and following rainfall events and at least daily during prolonged rainfall. Perform maintenance as needed or as required by the RE.

Maintain fiber rolls to provide an adequate sediment holding capacity and runoff velocity reduction.

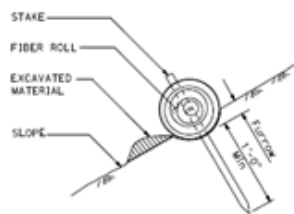
Fiber roll placement must be shown on the WPCDs.

SWPPP or WPCP

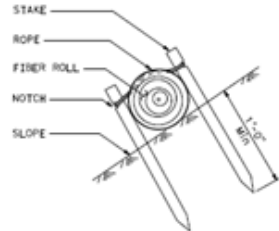
Fiber rolls must be discussed in Section 500.3 of the SWPPP or Section 30.2 of the WPCP.

Fiber Rolls

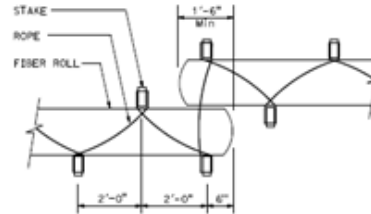
SC-5



SECTION
TEMPORARY FIBER ROLL
(TYPE 1)



SECTION
TEMPORARY FIBER ROLL
(TYPE 2)



PLAN

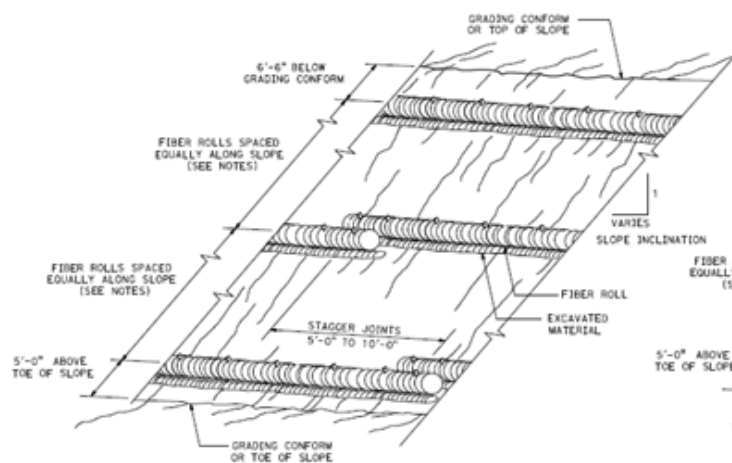


ELEVATION

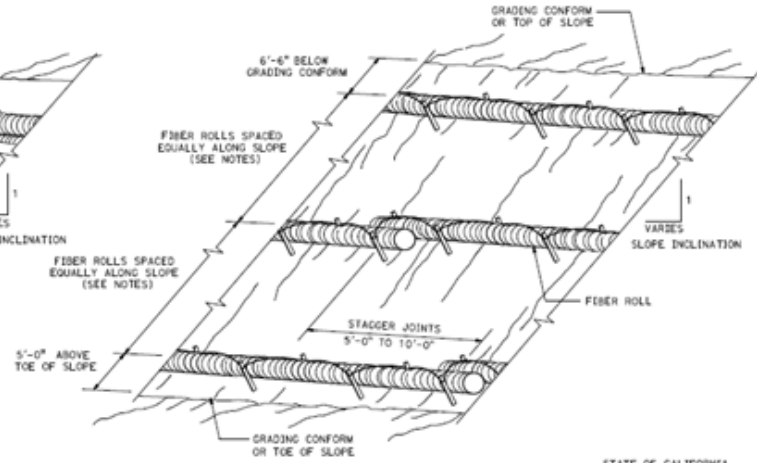
STAKE NOTCH DETAIL

SHEET	COUNTY	ROUTE	POST MILES	SHEET
			TOTAL PROJECT	
<i>Robert D. Smith</i> LICENSED LANDSCAPE ARCHITECT October 30, 2015 PROJECT APPROVAL DATE THE STATE OF CALIFORNIA OF ITS OFFICIALS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETION OF ANY COPIES OF THIS PLAN SHEET.				

- NOTES:**
1. Temporary fiber roll spacing varies depending upon slope inclination.
 2. Installations shown in the perspectives are for slope inclination of 10:1 and steeper.



PERSPECTIVE
TEMPORARY FIBER ROLL (TYPE 1)



PERSPECTIVE
TEMPORARY FIBER ROLL (TYPE 2)

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**TEMPORARY WATER POLLUTION
CONTROL DETAILS
(TEMPORARY FIBER ROLL)**

NO SCALE

T56



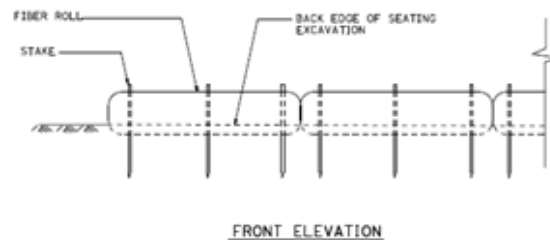
Fiber Rolls

SC-5

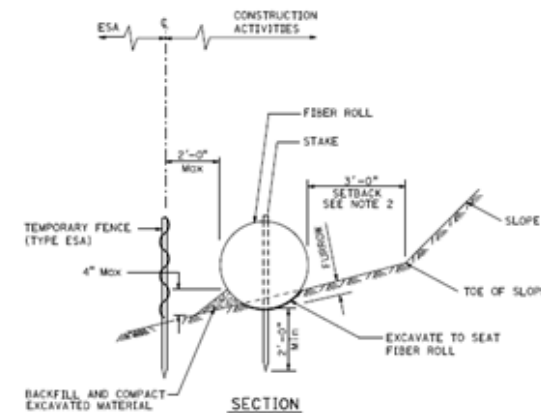
SHEET	COUNTY	ROUTE	POST MILES	SHEET
			TOTAL PROJECT	
<i>Robert D. Hest</i> LICENSED LANDSCAPE ARCHITECT				
October 30, 2015 PLANS APPROVAL DATE				
THE STATE OF CALIFORNIA BY ITS OFFICER OF ADJUTANT GENERAL, NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.				

NOTES:

1. Temporary fence (Type ESA) shown for reference purposes only.
2. Setback dimension may vary according to field conditions or as designated on plans.



TEMPORARY LARGE SEDIMENT BARRIER



**PLACEMENT DETAIL
FOR TEMPORARY FENCE (TYPE ESA)
USED WITH TEMPORARY LARGE SEDIMENT BARRIER**

(See Note 1)

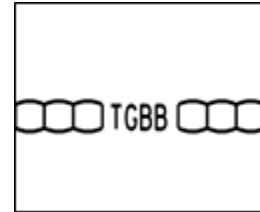
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

**TEMPORARY WATER POLLUTION
CONTROL DETAILS
(TEMPORARY LARGE SEDIMENT BARRIER)**

NO SCALE

T66





Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☒
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

A gravel bag berm consists of a single row of gravel bags that are installed end to end to form a barrier across a slope to intercept runoff, reduce its flow velocity, release the runoff as sheet flow and provide some sediment removal. Gravel bags can be used where flows are moderately concentrated, such as ditches, swales, and storm drain inlets (see SC-10 “Drainage Inlet Protection”) to divert and/or detain flows.

Earthen berms are linear sediment barriers designed to intercept sheet flows. Water gets impounded upstream of the earthen berm, allowing sediment to settle out and releasing runoff as sheet flow, preventing erosion.

Appropriate Applications

BMP may be implemented on a project-by-project basis with other BMPs when determined necessary and feasible by the RE.

Along streams and channels.

Below the toe of exposed and erodible slopes.

Down slope of exposed soil areas.

Around stockpiles.

Across channels to serve as a barrier for utility trenches or provide a temporary channel crossing for construction equipment, to reduce stream impacts.

Parallel to a roadway to keep sediment off paved areas.

At the top of slopes to divert roadway runoff away from disturbed slopes.

Along the perimeter of a site.

To divert or direct flow or create a temporary sediment basin.

During construction activities in stream beds when the contributing drainage area is less than 5 ac.

When extended construction period limits the use of either silt fences or straw bale barriers.

When site conditions or construction sequencing require adjustments or relocation of the barrier to meet changing field conditions and needs during construction.

At grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.

Limitations

Degraded gravel bags may rupture when removed, spilling contents.

Installation can be labor intensive.

Limited durability for long term projects.

When used to detain concentrated flows, maintenance requirements increase.

Earthen berms should not be used to intercept flows with moderate to high velocities that may erode the earthen berm.

Earthen berms are susceptible to erosion from concentrated flows.

Standards and Specifications

Materials

Bag Material

The gravel bag material must comply with Section 96-1.02F Gravel-Filled Bag of the Standard Specifications.

Bag Size

Each gravel-filled bag should have a length of 24 to 32 inches, width of 16 to 20 inches, and thickness of 3 inches. Alternative bag sizes must be submitted to the RE for approval prior to deployment.

Gravel

Fill material should be between 3/8 and 3/4 inch in diameter, and be clean and free from clay balls, organic matter, and other deleterious materials. The opening of gravel-filled bags must be secured such that gravel

does not escape. Gravel-filled bags are between 30 and 50 lb in weight. Fill material is subject to approval by the RE.

Earthen berms must comply with Standard Specifications Section 13-10.03I

Installation

When used as a linear control for sediment removal:

- Install along a level contour.
- Place gravel-filled bags end-to-end to eliminate gaps in a gravel bag berm.
- Angle the last 6 feet upslope at the downhill end of the run.
- Stack the bags such that the upper row overlaps the joints in the lower row.
- Add layers of gravel-filled bags to increase the height of a temporary gravel bag berm if needed. Stack the bags in the upper row to overlap the joints in the lower row. Stabilize the rows by adding rows of bags in the lower layers.

Generally, gravel bag barriers can be used in conjunction with temporary soil stabilization controls up slope.

Construct gravel bag barriers with a set-back from the toe of a slope. Where it is determined to be not practicable due to specific site conditions, the gravel bag barrier may be constructed at the toe of the slope, but be constructed as far from the toe of the slope as practicable.

Refer to SC-4 “Check Dams” when used for concentrated flows.

Submit a certificate of compliance for gravel-filled bag material.

Earthen berms are constructed with either native soil or an alternative selected material.

Earthen berms must be at least 8 inches in height and 36 inches in width.

Earthen berms must be compacted by manual or mechanical methods.

Maintenance and Inspection

Gravel bag/earthen berms must be inspected in accordance with CGP requirements for the associated project type and risk level or with LTCGP. At a minimum, BMPs must be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

Reshape or replace gravel bags as needed, or as directed by the RE.

Repair washouts or other damages as needed, or as directed by the RE.

Inspect gravel bag/earthen berms for sediment accumulations and remove sediment when accumulation reaches one-third of the berm height. Removed sediment can be incorporated in the project at locations designated by the RE or disposed of outside the highway right of way in conformance with the Standard Specifications.

Gravel Bag/Earthen Berm

SC-6

Remove gravel bag berms when no longer needed. Remove sediment accumulations and clean, re-grade, and stabilize the area.

If using earthen berm, ensure soil remains compacted through the duration of the berm

Maintain earthen berms to provide sediment-holding capacity and to reduce concentrated flow velocities.

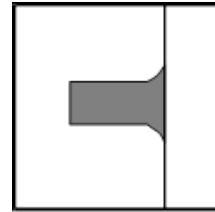
Repair the berm if rills or other evidence of concentrated runoff over it.

Gravel Bag/Earthen Berm placement must be shown on the WPCDs and reflect site conditions.

SWPPP or WPCP

Gravel Bag/Earthen Berm must be discussed in Section 500.3 SWPPP or Section 30.2 of the WPCP.





Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☒
Tracking Control	☒
Wind Erosion Control	☒
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

Practices to remove tracked sediment to prevent the sediment from entering a storm drain or receiving waters.

Appropriate Applications

These practices are implemented anywhere sediment is tracked from the project site onto public or private paved roads, typically at jobsite entrances and exits.

Limitations

Sweeping and vacuuming may not be effective when soil is wet or muddy.

Standards and Specifications

General Requirements

Sweep by hand or mechanical methods, such as vacuuming. Kick brooms or sweeper attachments may not be used.

At least one street sweeper in good working order must be at the job site at all times when street sweeping work is required.

Use one of the following types of street sweepers:

- Mechanical sweeper followed by a vacuum-assisted sweeper;
- Vacuum-assisted, dry, waterless, sweeper; or
- Regenerative-air sweeper.

Submit the number and type of street sweepers that will be used on the project for each activity at least 5 business days before starting the activities listed above. Keep and submit street sweeping activity records including sweeping times, locations, and the quantity of material collected.

Sweep paved roads at construction entrance and exit locations and onsite paved areas:

- During clearing and grubbing, earthwork, trenching, and pavement-structure construction activities.
- When vehicles are entering and leaving the job site.
- After soil-disturbing activities.
- After observing off-site tracking of material.

Sweep within 1 hour if sediment or debris is observed during the activities described above that require sweeping.

Sweep within 24 hours if sediment or debris is observed during activities that do not require sweeping.

Keep dust to a minimum during street sweeping activities. Use water for dust control or a vacuum whenever dust generation is excessive or sediment pickup is ineffective. Refer to WE-1 for “Wind Erosion Control” BMPs.

Remove collected material, including sediment, from paved shoulders, drainage inlets, curbs and dikes, and other drainage areas.

After sweeping is finished, collected material may be stockpiled. If not mixed with debris, trash or potentially hazardous objects, consider incorporating the removed sediment back into the project if approved by the RE. Otherwise, dispose of stockpiled material at least once per week according to Standard Specifications Section 14-10.

Street sweeping does not void the requirements for residue collection included in other work activities, such as grooving, grinding, or asphalt concrete planing.

Maintenance and Inspection

Inspect potential sediment tracking locations daily.

Monitor and inspect tracking control BMPs such as TC-1, “Temporary Construction Entrance/Exit,” to reduce sediment accumulation on roads.

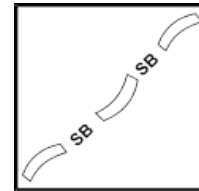
Be careful not to sweep up any unknown substance or any object that may be potentially hazardous.

Adjust brooms frequently; maximize efficiency of sweeping operations.

Sweeper material must be disposed in compliance with waste regulations.

SWPPP or WPCP

Street Sweeping must be discussed in Section 500.3.4 and 600.2 of the SWPPP or Section 30.2.3 of the WPCP.



Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☒
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

A sandbag barrier is a temporary linear sediment barrier consisting of stacked sandbags, designed to intercept and slow the flow of sediment-laden sheet flow runoff. Sandbag barriers allow sediment to settle from runoff before water leaves the construction site.

Appropriate Applications

Along the perimeter of a site.

Along streams and channels.

Below the toe of exposed and erodible slopes.

Down slope of exposed soil areas.

Around stockpiles.

Across channels to serve as a barrier for utility trenches or provide a temporary channel crossing for construction equipment, to reduce stream impacts.

Parallel to a roadway to keep sediment off paved areas.

At the top of slopes to divert roadway runoff away from disturbed slopes.

To divert or direct flow or create a temporary sediment/desilting basin.

During construction activities in stream beds when the contributing drainage area is less than 5 ac.

When extended construction, period limits the use of either silt fences or straw bale barriers.

Along the perimeter of vehicle and equipment fueling and maintenance areas or chemical storage areas.

To capture and detain non-stormwater flows until proper cleaning operations occur.

When site conditions or construction sequencing require adjustments or relocation of the barrier to meet changing field conditions and needs during construction.

To temporarily close or continue broken, damaged or incomplete curbs.

Limitations

Limit the drainage area upstream of the barrier to 5 ac.

Degraded sandbags may rupture when removed, spilling sand.

Installation can be labor intensive.

Limited durability for long-term projects.

When used to detain concentrated flows, maintenance requirements increase.

Consider using gravel bags whenever possible since they often do not require as much maintenance or impact wildlife when used near ESAs.

Standards and Specifications

Materials

Sandbag Material

Sandbag can be woven polypropylene, polyethylene or polyamide fabric, minimum unit weight four ounces per square yard, mullen burst strength exceeding 300 psi in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70% in conformance with the requirements in ASTM designation D4355. Use of burlap is not acceptable.

Sandbag Size

Each sand-filled bag should have a length of 18 in, width of 12 in, thickness of 3 in, and mass of approximately 33 lb. Bag dimensions are nominal, and may vary based on locally available materials. Alternative bag sizes must be submitted to the RE for approval prior to deployment.

Fill Material

All sandbag fill material can be non-cohesive, Class 1 or Class 2 permeable material free from clay and deleterious material, conforming to the provisions in Standard Specifications Section 47-2.02D “Permeable Material”. The requirements for the Durability Index and Sand Equivalent do not apply. Fill material is subject to approval by the RE.

Installation

When used as a linear sediment control:

- Install along a level contour.
- Turn ends of sandbag row up slope to prevent flow around the ends.
- Generally, sandbag barriers may be used in conjunction with temporary soil stabilization controls up slope to provide effective erosion and sediment control.

Construct sandbag barriers with a set-back of at least 3 ft from the toe of a slope. Where it is determined to be not practical due to specific site conditions, the sandbag barrier may be constructed at the toe of the slope, but should be constructed as far from the toe of the slope as practicable.

Maintenance and Inspection

Inspect sandbag barriers before and after each rainfall event, and weekly year round.

Reshape or replace sandbags as needed, or as directed by the RE.

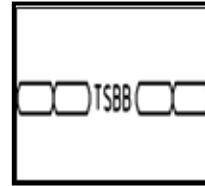
Repair washouts or other damages as needed, or as directed by the RE.

Inspect sandbag barriers for sediment accumulations and remove sediments when accumulation reaches one-third the barrier height. Removed sediment can be incorporated in the project at locations designated by the RE or disposed of outside the highway right of way in conformance with the Standard Specifications 14-10.

Remove sandbags when no longer needed. Remove sediment accumulation, and clean, re-grade, and stabilized the area.

SWPPP or WPCP

Sandbag Barrier must be discussed in Section 500.3 of the SWPPP or Section 30.2 of the WPCP.



Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☒
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

A straw bale barrier is a temporary linear sediment barrier consisting of straw bales, designed to intercept and slow sediment-laden sheet flow runoff. Straw bale barriers allow sediment to settle from runoff before water leaves the construction site.

Appropriate Applications

Along the perimeter of a site.

Along streams and channels.

Below the toe of exposed and erodible slopes.

Down slope of exposed soil areas.

Around stockpiles.

Across minor swales or ditches with small catchments.

Around above grade type temporary concrete washouts (see WM-8, “Concrete Waste Management”).

Parallel to a roadway to keep sediment off paved areas.

Limitations

Installation can be labor intensive.

Straw bale barriers are maintenance intensive.



Degraded straw bales may fall apart when removed or left in place for extended periods.

Can't be used on paved surfaces.

Not to be used for drain inlet protection.

Not to be used in areas of concentrated flow.

Can be an attractive food source for some animals.

May introduce undesirable non-native plants to the area.

Standards and Specifications

Materials

Straw must conform to the provisions in Standard Specifications Section 21-2.02H, "Straw."

Each straw bale should be a minimum of 14 in wide, 18 in high, 36 in long and have a minimum weight of 50 lb.

The straw bale must be composed entirely of vegetative matter, except for the binding material.

Bales can be bound by either wire, nylon, or polypropylene string placed horizontally. Jute and cotton binding may not be used. Baling wire should be at least 16 gauge. Nylon or polypropylene string should have a diameter of approximately 0.08 in with a breaking strength of 80 lbs.

Wood or metal posts should be used as stakes. Posts for straw bale barriers must comply with Standard Specifications Section 16-2.03 "High-Visibility Fences."

Installation

Place a single row of straw bales end-to-end and parallel with the slope contour. For any 20-foot section of straw bale barrier, do not allow it to vary by more than 5% from level.

Place straw bales in a trench or key them into the slope. Place the bales such that the binding wire or string does not come in contact with the soil. Use wood or metal posts as stakes.

Secure each straw bale with two posts. The first post in each bale must be driven toward the previously laid bale to force the bales together. Drive the posts into the soil such that the top of the post is less than 2 in. above the top of the straw bale. The post must extend a minimum of 2 ft in the ground below the bottom of the straw bales.

Angle the last 6 feet upslope at the downhill end of the run.

See page 5 of this BMP for installation detail.

Other Considerations

Construct straw bale barriers with a set-back of at least 3 ft from the toe of a slope. Where it is determined to be not practical due to specific site conditions, the straw bale barrier may be constructed at the toe of the slope, but be constructed as far from the toe of the slope as practical.

This BMP may be implemented on a project-by-project basis in addition to other BMPs when determined necessary and feasible by the RE.

Straw bale barriers may be used in combination with a silt fence (see SC-2 “Silt Fence”) for additional sediment control.

Maintenance and Inspection

At a minimum, BMPs must be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

Inspect straw bale barriers for sediment accumulations and remove sediment when depth reaches one-third the barrier height. Removed sediment should be disposed of outside the highway right-of-way in conformance with the Standard Specifications.

Replace or repair damaged bales as needed or as directed by the RE.

Repair washouts or other damages as needed or as directed by the RE.

Remove straw bales when no longer needed. Remove sediment accumulation, and clean, re-grade, and stabilized the area.

Straw Bale Barrier placement must be shown on the WPCDs and reflect current site conditions.

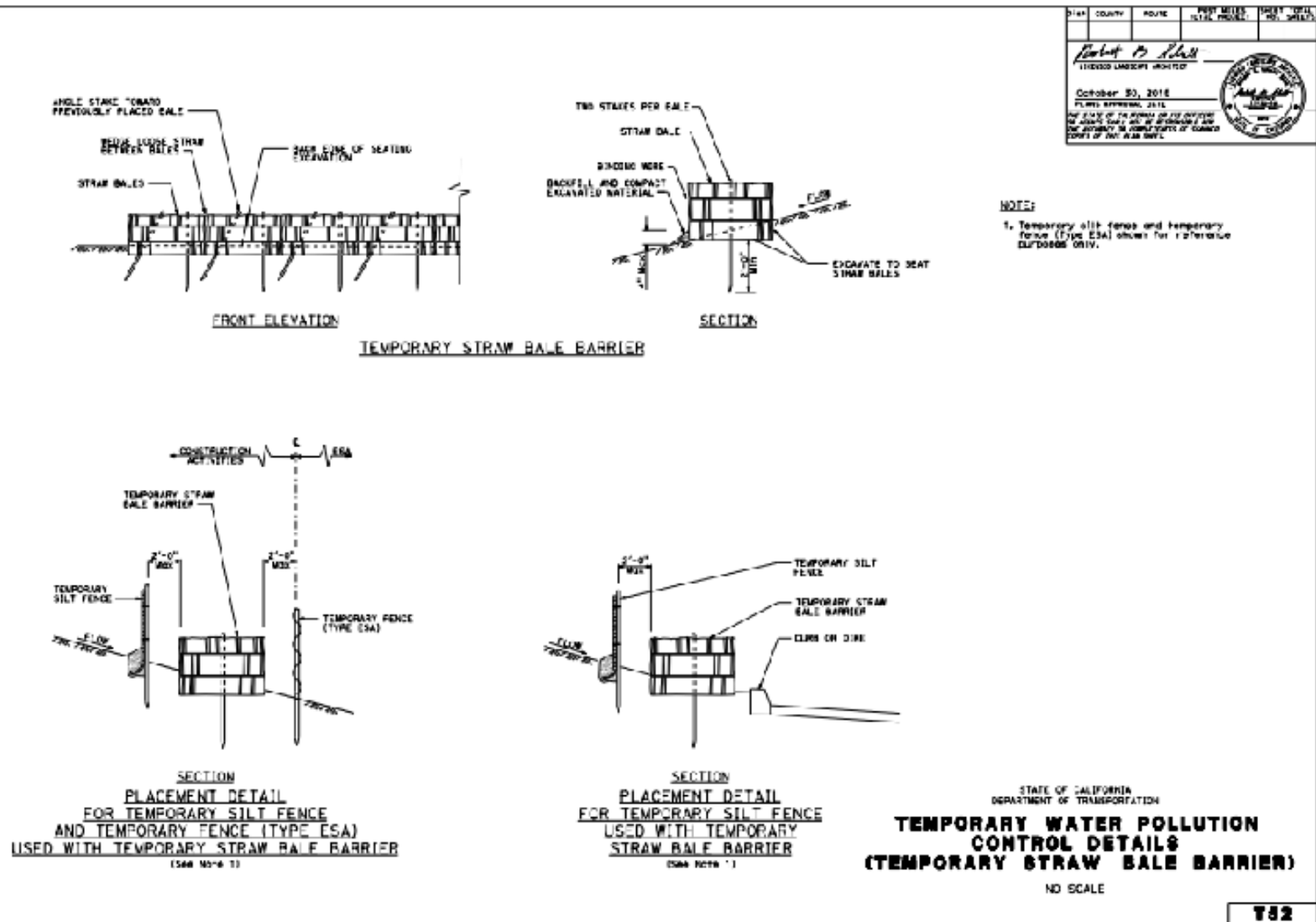
SWPPP or WPCP

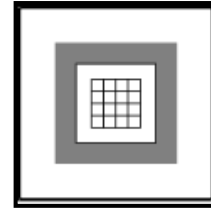
Straw Bale Barrier must be discussed in Section 500.3 of the SWPPP or Section 30.2 of the WPCP.

Straw Bale Barrier

SC-9

2015 STANDARD PLAN T82





Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☒
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

Temporary drainage inlet protection consists of devices used at storm drain inlets that detain and/or filter sediment-laden runoff prior to discharge into storm drainage systems. This is achieved by allowing sediment to settle and/or filtering sediment upstream of a linear sediment barrier.

Appropriate Applications

Where ponding will not encroach into highway traffic.

Where sediment laden surface runoff may enter an inlet.

Where disturbed drainage areas have not yet been permanently stabilized.

Where the drainage area is 1 ac or less.

Used year-round.

Limitations

Requires an adequate area for water to pond without encroaching upon traveled way and should not present an obstacle to oncoming traffic.

May require other methods of temporary protection to prevent sediment-laden stormwater and non-stormwater discharges from entering the storm drain system.

Sediment removal may be difficult in high flow conditions or if runoff is heavily sediment laden. If high flow conditions are expected, use other on-site sediment trapping techniques, such as SC-4 “Check Dams,” in conjunction with temporary drainage inlet protection.

Frequent maintenance is required.

Silt fence inlet protection is appropriate in open areas that are subject to sheet flow and for flows not exceeding 0.5 cfs.

Gravel bag barriers for inlet protection are applicable when sheet flows or concentrated flows exceed 0.5 cfs, and it is necessary to allow for overtopping to prevent flooding.

Fiber rolls and foam barriers are not appropriate for locations where they cannot be properly anchored to the surface.

Excavated drop inlet sediment traps are appropriate where relatively heavy flows are expected and overflow capability is needed.

For drainage areas larger than 1 ac, runoff should be routed to a sediment trapping device designed for larger flows. See BMPs SC-2, “Sediment/Desilting Basin,” and SC-3 “Sediment Trap/Curb Cutback.”

Standards and Specifications

General Requirements

Refer to Standard Specifications Section 13-6.03C for “Temporary Drainage Inlet Protection” and 13-6.03F for “Rigid Plastic Barriers.”

Identify existing and/or planned storm drain inlets that have the potential to receive sediment-laden surface runoff. Determine if storm drain inlet protection is needed, and which method or combination of methods to use. Update inlet protection as site conditions change.

Use a linear sediment barrier to redirect runoff and control ponding in order to prevent ponding from encroaching on the traveled way or overtopping the curb or dike.

Prior to installation, clear the area around each inlet of obstructions, including rocks, clods, and debris greater than 1-in. in diameter.

Install linear sediment barriers upstream of the inlet and parallel with the curb, dike, or flow line to keep sediment from entering the inlet.

Remove accumulated sediment according to Maintenance and Inspection recommendations. Accumulated sediment may be disposed of outside the highway right-of-way in conformance with the Standard Specifications Section 14-10.

Type 1: Silt Fence

This method should be used for drain inlets requiring protection in areas where finished grade is established and erosion control seeding has been applied or is pending. The silt fence (Type 1) protection is illustrated on Page 6. Do not place filter fabric underneath the inlet grate since the collected sediment may fall into the drain inlet when the fabric is removed or replaced.

Type 2 - Excavated Drop Inlet Sediment Trap

This method may be used for drainage inlets requiring protection in areas that have been cleared and grubbed, and where exposed soil areas are subject to grading. The excavated drop inlet sediment trap (Type 2) is illustrated on Page 7. Similar to constructing a temporary silt fence; see BMP SC-1, “Silt Fence.” Size the excavated trap to provide a minimum storage capacity calculated at the rate of 67 yd³/ac of drainage area.

Type 3A: Gravel Bag Berm for Combined Inlets

This method may be used for drain inlets surrounded by AC or paved surfaces. The gravel bag berm for combined inlets (Type 3A) is illustrated on Pages 8-9. Flow from a severe storm must not overtop the curb. In areas of high clay and silts, use filter fabric and gravel as additional filter media. Construct gravel bags in accordance with BMP SC-6, “Gravel Bag Berm.” Gravel bags are used due to their high permeability.

Type 3B: Gravel Bag Berm for Grate Inlets

This method may be used for drainage inlets surrounded by AC or paved surfaces. The gravel bag berm for grate inlets (Type 3B) is illustrated on Page 10. In areas of high clay and silts, use filter fabric and gravel as additional filter media. Place gravel bags in accordance with BMP SC-6, “Gravel Bag Berm.” Gravel bags are used due to their high permeability.

Type 4A – Flexible Sediment Barrier for Grate Inlets

This method may be used for drainage inlets requiring protection in areas that have been cleared and grubbed, and where exposed soil areas subject to grading. Flexible Sediment Barrier for Grate Inlets (Type 4A) is placed around the inlet and keyed and anchored to the surface. Flexible Sediment Barriers are intended for use as inlet protection where the area around the inlet is unpaved and the foam barrier or fiber roll can be secured to the surface. Place fiber rolls over the erosion control blanket. RE or appropriate licensed professional approval is required.

Type 4B – Flexible Sediment Barrier for Combined Inlets

This method may be used for drainage inlets requiring protection in areas that have been cleared and grubbed, and where exposed soil areas subject to grading. Flexible Sediment Barrier for Combined Inlets (Type 4B) is placed in rows upstream of the inlet and along the curb or dike. The barriers are keyed and anchored to the surface. Flexible Sediment Barriers are intended for use as inlet protection where the area around the inlet is unpaved and the foam barrier or fiber roll can be secured to the surface. Place the barrier to provide a tight joint with the curb or dike. Cut the cover fabric or jacket to ensure a tight fit. RE and Construction Storm Coordinator approval is required.

Type 5 – Sediment Filter Bag

This method may be used in areas with vehicle and equipment traffic that could damage aboveground inlet protection devices. The Sediment Filter Bags are installed as follows: (1) Remove the drainage inlet grate, (2) Place the sediment filter bag in the opening, and (3) Replace the grate to secure the sediment filter bag in place.

Type 6A – Catch Basin with Grate

Catch Basin with Grate (Type 6A) is shown on page 16. Cover grate inlet with rigid plastic barrier and secure on each end with gravel-filled bags. If using a rigid sediment barrier and the grated inlet does not have a curb opening, placed the barrier using a gasket to prevent runoff from flowing under the barrier. Secure the barrier to the pavement with nails and adhesive, gravel-filled bags, or a combination of both.

Type 6B – Curb Inlet without Grate

Curb Inlet without Grate (Type 6B) is shown on page 16. Place the flexible sediment barrier across the curb inlet opening and secure with gravel-filled bags.

Maintenance and Inspection

General Requirements

Inspect all drainage inlet protection devices before and after every rainfall event and weekly year round. During extended rainfall events, inspect inlet protection devices at least once every 24 hours.

Inspect the storm drain inlet after severe storms to check for bypassed material.

Remove all drainage inlet protection devices within thirty days after the site is stabilized, or when the inlet protection is no longer needed.

- Bring the disturbed area to final grade and smooth and compact it. Appropriately stabilize all bare areas around the inlet.
- Clean and re-grade area around the inlet and clean the inside of the storm drain inlet as it must be free of sediment and debris at the time of final inspection.

Type 1 - Filter Fabric Fence

Make sure the stakes are securely driven in the ground and are structurally sound (i.e., not bent, cracked, or splintered, and are reasonably perpendicular to the ground). Replace damaged stakes.

Replace or clean the fabric when the fabric becomes clogged with sediment. Make sure the fabric does not have any holes or tears. Repair or replace fabric as needed or as directed by the RE.

At a minimum, remove the sediment behind the fabric fence when accumulation reaches one-third the height of the fence or barrier height.

Type 2 – Excavated Drop Inlet Sediment Trap

Remove sediment from basin when the volume of the basin has been reduced by one-half.

Type 3A - Gravel Bag Berm for Combined Inlets

Inspect bags for holes, gashes, and snags.

Check gravel bags for proper arrangement and displacement. Remove the sediment behind the barrier when it reaches one-third the height of the barrier.

Type 3B - Gravel Bag Berm for Grate Inlets

Inspect bags for holes, gashes, and snags.

Check gravel bags for proper arrangement and displacement. Remove the sediment behind the barrier when it reaches one-third the height of the barrier.

Type 4A Flexible Sediment Barrier for Grate Inlets

Check flexible sediment barrier for proper arrangement and displacement. Remove the sediment behind the barrier when it reaches one-third the height of the barrier.

Type 4B Flexible Sediment Barrier for Combined Inlets

Check flexible sediment barrier for proper arrangement and displacement. Remove the sediment behind the barrier when it reaches one-third the height of the barrier.

Type 5 Sediment Filter Bag

Change sediment filter bag carefully ensuring not to spill captured sediment into the drainage inlet.

Type 6A Catch Basin with Grate

Check barrier and gravel-filled bags for proper arrangement and displacement. Routinely remove accumulated sediment

Type 6B Curb Inlet without Grate

Check barrier and gravel-filled bags for proper arrangement and displacement.

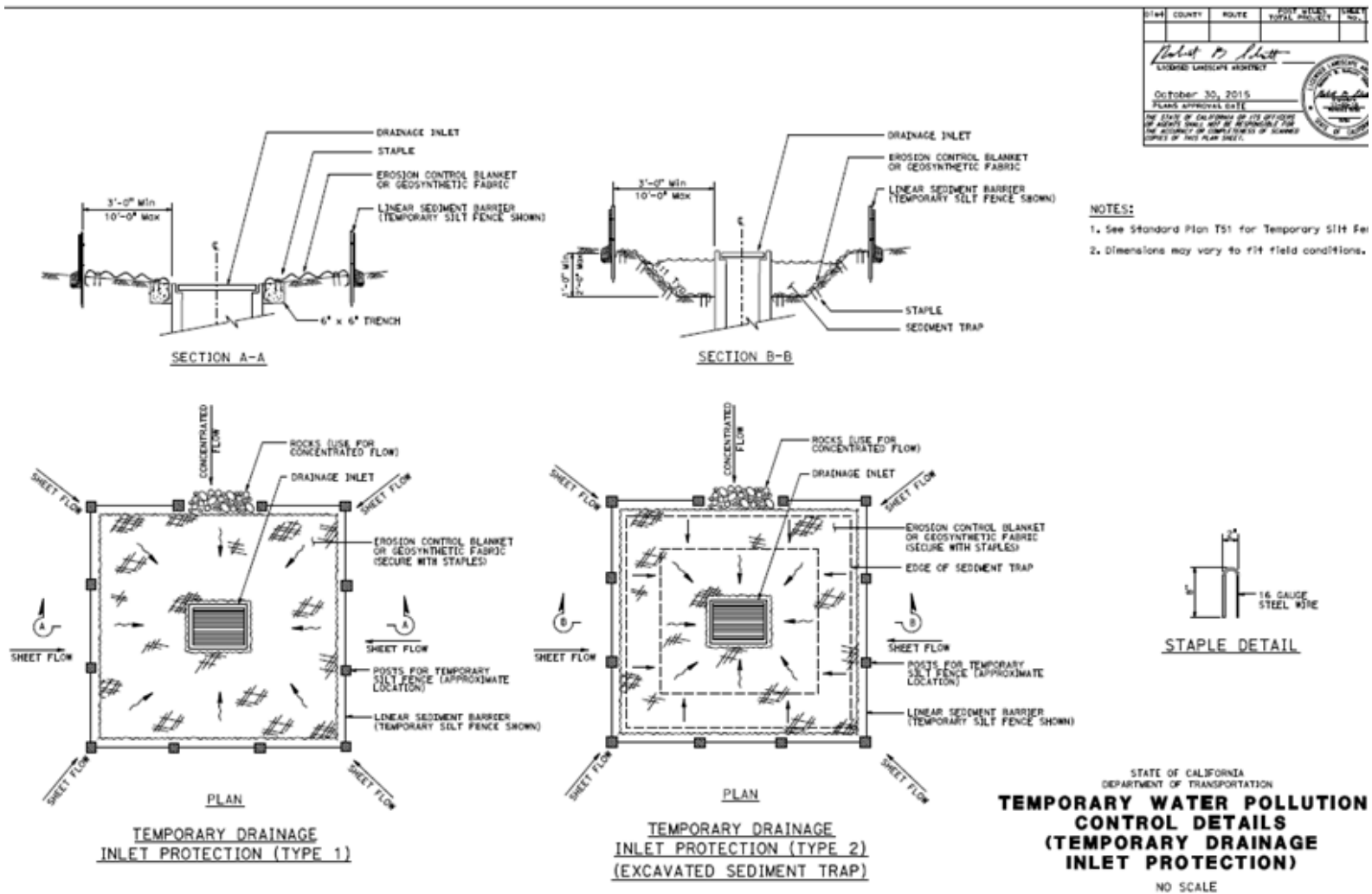
Remove the sediment behind the barrier when it reaches one-third the height of the barrier.

SWPPP or WPCP

Temporary Drainage Inlet Protection must be discussed in Section 500.3.2 of SWPPP and/or Section 30.2.2 of the WPCP. Temporary Drainage Inlet Protection placement type must be shown on the WPCDs and reflect site temporary conditions.

Temporary Drainage Inlet Protection

SC-10

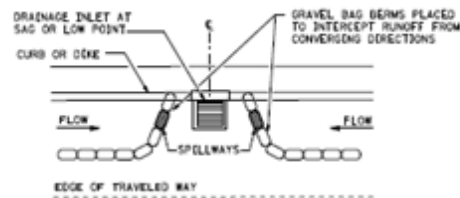


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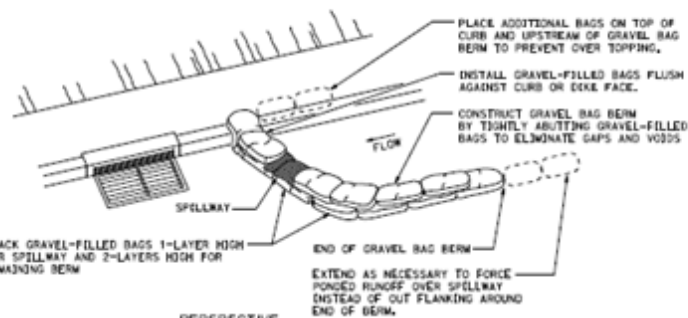


Temporary Drainage Inlet Protection

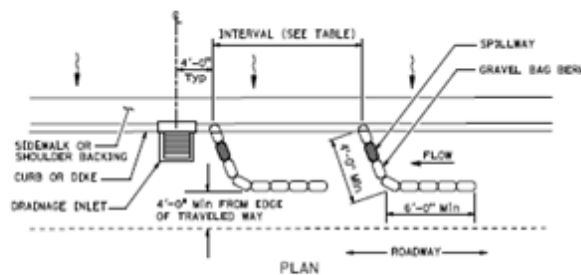
SC-10



**CONFIGURATION FOR SAG POINT INLET
(GRAVEL BAG BERM)**



PERSPECTIVE

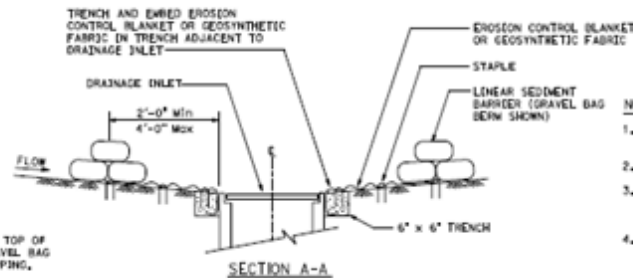


**TEMPORARY DRAINAGE
INLET PROTECTION (TYPE 3A)
(GRAVEL BAG BERM)**

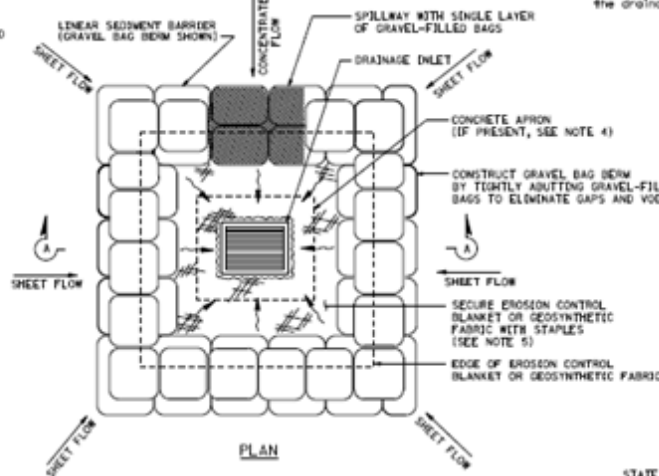
GRAVEL BAG BERM (TYPE 3A) SPACING TABLE

SLOPE OF ROADWAY (PERCENT)	1 TO 3.9	4 TO 5.9	6 TO 7.9	8 TO 10	10+
INTERVAL BETWEEN BERM	100'	75'	50'	25'	12'

For slope of less than 1%, install barriers only if erosion/sediment is prevalent



SECTION A-A



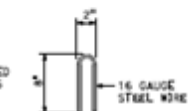
PLAN

**TEMPORARY DRAINAGE
INLET PROTECTION (TYPE 3B)**

DATE	COUNTY	ROUTE	POST MILE	SHEET NO.	TOTAL SHEETS
October 30, 2015					
DESIGNED: [Signature]					
CHECKED: [Signature]					
DATE: October 30, 2015					
SCALE: [Blank]					
THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION AND PUBLIC UTILITIES IS NOT RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF DRAWINGS OR SPECIFICATIONS OF THIS PLAN SHEET.					

NOTES:

1. Place safety cones adjacent to drainage inlet protection.
2. Dimensions may vary to fit field conditions.
3. Install a minimum of 3 gravel bag berms upstream of each drainage inlet to be protected.
4. Position erosion control blanket or geosynthetic fabric at edge of concrete apron and secure in trench.
5. Erosion control blanket or geosynthetic fabric is not required if the area adjacent to the drainage inlet is vegetated or paved.



STAPLE DETAIL

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY DRAINAGE INLET PROTECTION)

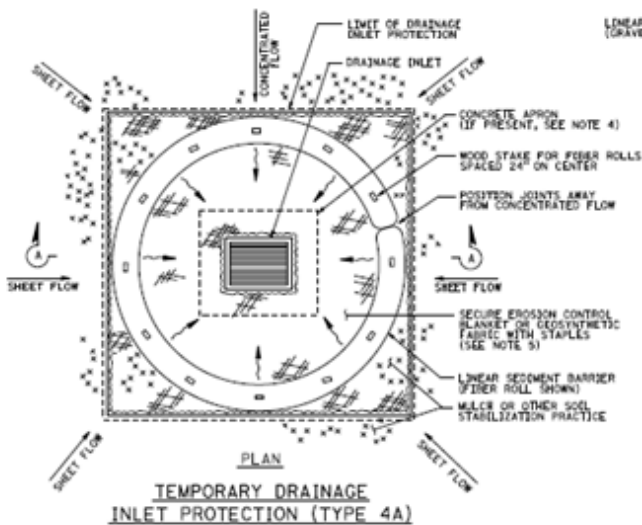
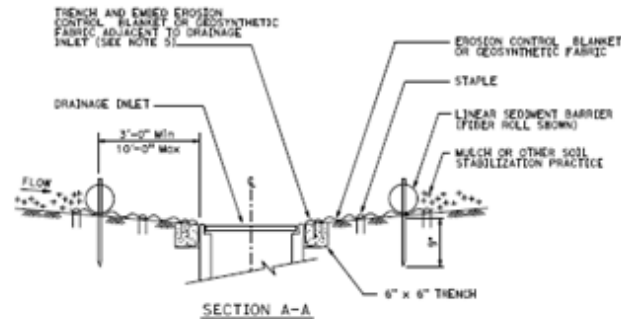
NO SCALE

T62



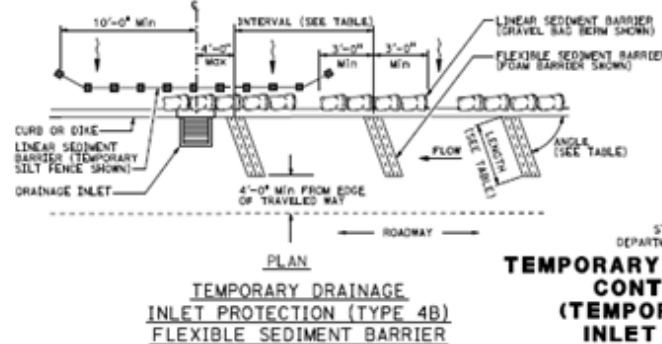
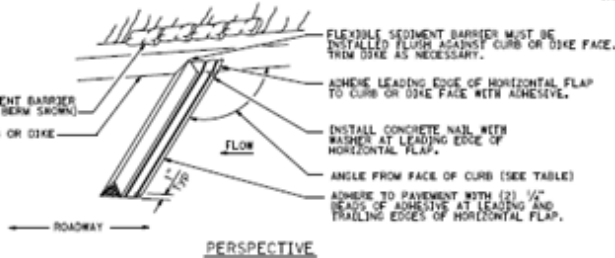
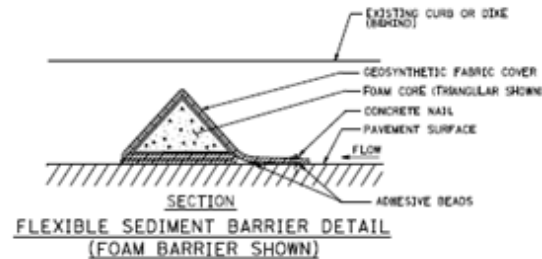
Temporary Drainage Inlet Protection

SC-10



FLEXIBLE SEDIMENT BARRIER SPACING TABLE

SLOPE OF ROADWAY (PERCENT)	0 TO 0.9	1 TO 1.9	2 TO 2.9	3 TO 4	5+
INTERVAL BETWEEN BARRIERS	50'	35'	30'	25'	20'
ANGLE FROM FACE OF CURB	70°	70°	70°	45°	45°
SUGGESTED BARRIER LENGTH	6'	6'	6'	6'	6'



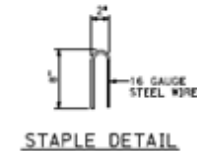
STATE COUNTY ROUTE DIST MILE TOTAL SHEET NO. 34

October 30, 2015
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCHEMATIC COPIES OF THIS PLAN SHEET.

NOTES:

1. See Standard Plan T51 for Temporary Silt Fence.
2. Dimensions may vary to fit field conditions.
3. Install a minimum of 3 flexible sediment barriers upstream of each drainage inlet to be protected.
4. Position erosion control blanket or geosynthetic fabric at edge of concrete apron and secure in trench.
5. Erosion control blanket or geosynthetic fabric is not required if the area adjacent to the drainage inlet is vegetated.



STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY DRAINAGE INLET PROTECTION)

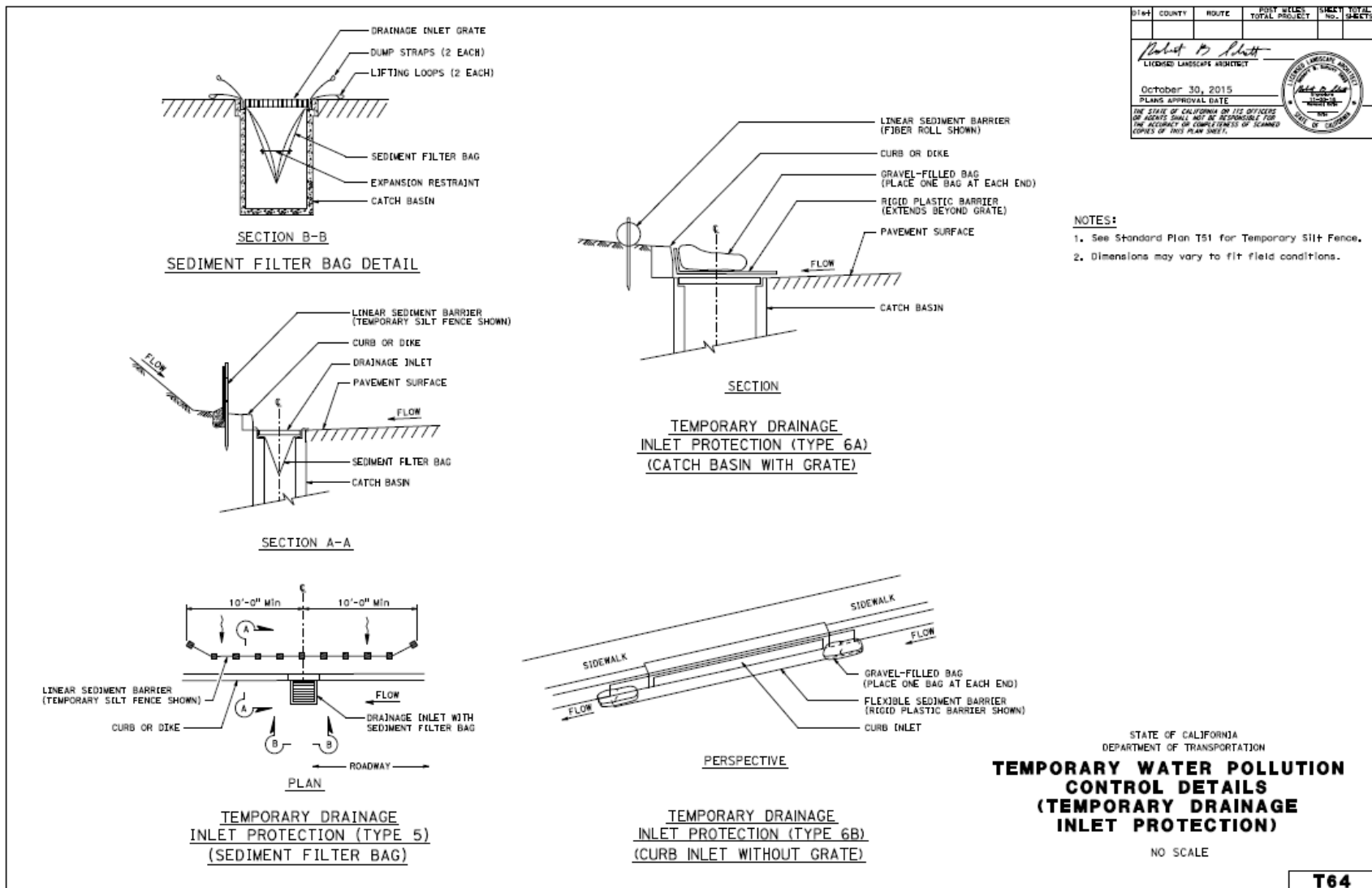
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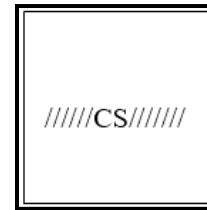
T63



Temporary Drainage Inlet Protection

SC-10





Standard Symbol

BMP Objectives	
Soil Stabilization	☒
Sediment Control	☒
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

Compost socks are a mesh sock containing compost that act as three dimensional, biodegradable structures that intercept and filter sheet flow. Compost socks can filter runoff, retain sediment, and reduce sheet flow velocities. Compost socks may be used as either a temporary or permanent sediment control measure.

Appropriate Applications

Compost socks may be applied as both temporary and permanent sediment controls.

Along the toe, top, face, and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.

Along the perimeter of a project.

As check dams in unlined ditches.

Down-slope of exposed soil areas.

At operational storm drains as a form of inlet protection.

Around temporary stockpiles.

Limitations

Compost can potentially leach nutrients into runoff and negatively affect water quality. Compost should not be used directly upstream from a nutrient-impaired water body.

Compost socks are susceptible to damage by traffic. Compost socks may be used around heavy machinery, but frequent disturbance decreases sock performance.

Standards and Specifications

General Requirements

Compost socks must comply with Standard Specifications 21-2.02Q and 21-2.03Q.

Compost for compost socks must comply with Standard Specifications Section 21-2.02K, except the particle size must be for coarse compost.

Compost sock installation is illustrated in Standard Plan H51.

Compost socks consist of a 12-inch diameter mesh tube that is filled with compost. The mesh tube must be composed of a natural biodegradable product such as cotton, jute, sisal, burlap, or coir. The mesh tube must be clean, evenly woven, and free of encrusted concrete or other contaminating materials, cuts, tears, broken or missing yarns, and thin, open, or weak places.

Compost socks must have a functional longevity of one year.

Installation

Before installing compost sock, remove obstructions from the ground including rocks, clods, and debris greater than 1 inch in diameter.

For any 20-foot section of compost sock, prevent the compost sock from varying more than 5 percent from level.

Use the following spacing unless otherwise noted on the project plans or special provisions:

- 10 feet apart for slopes steeper than 2:1 (H:V)
- 15 feet apart for slopes from 2:1 to 4:1 (H:V)
- 20 feet apart for slopes from 4:1 to 10:1 (H:V)
- 50 feet apart for slopes flatter than 10:1 (H:V)

Place mesh tube, secure the end, and fill uniformly with compost. Secure the remaining end.

For Type 1 installations:

- Place in a furrow that is from 2 to 4 inches deep.
- Fasten with wood stakes every 4 feet along the length of the compost sock.
- Fasten the ends of the compost sock by placing a stake 6 inches from the end of the sock.
- Drive the stakes into the soil so the top of the stake is less than 2 inches above the top of the compost sock.

For Type 2 installations:

- Fasten with notched wood stakes and rope.

- Drive stakes into the soil until the notch is even with the top of the compost sock.
- Lace the rope between stakes and over the compost sock. Knot the rope at each stake.
- Tighten the fiber roll to the surface of the slope by driving the stakes further into the soil.

If more than one compost sock is placed in a row, the socks should be overlapped; not abutted. Stagger overlapping joints in adjacent rows by 5 to 10 feet.

Removal

For permanent installations: do not remove compost socks. Compost socks will degrade over time.

For temporary installations: remove sock, rope and stakes if ordered by the RE. Cut sock and empty contents in place.

Other Considerations

Compost may be pre-seeded before placement into the mesh tube to assist in establishing vegetation. Once established, vegetation root systems provide additional soil stability and runoff filtration.

Permanent compost sock applications are particularly advantageous below embankments, especially adjacent streams, by limiting re-entry and the disturbance to sensitive areas.

Organic material in compost is important for pollutant removal and vegetation establishment. Organic content of the compost should range from 30 to 65% depending on site conditions.

Maintenance and Inspection

Inspect compost socks before and after each rainfall event, and weekly year round.

Remove sediment from behind the compost sock if sediment is 1/3 of compost sock height above ground.

Repair or adjust the compost sock if rills or other evidence of concentrated runoff occur beneath the sock.

Repair or replace compost socks if they become split, torn, or unraveled.

Add stakes if the compost sock slumps or sags.

Replace broken or split wood stakes.

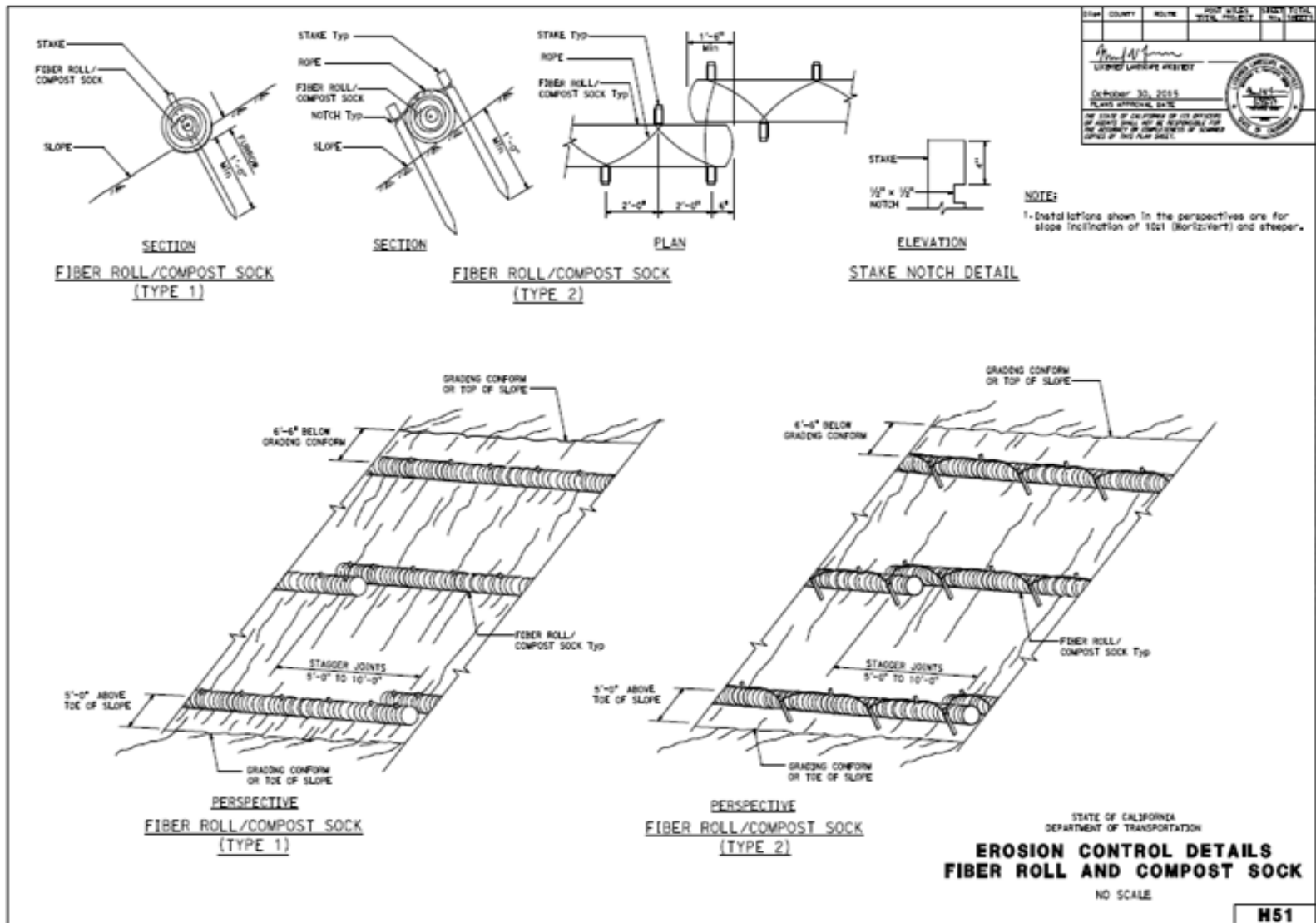
Maintain compost socks to provide an adequate sediment holding capacity and runoff velocity reduction.

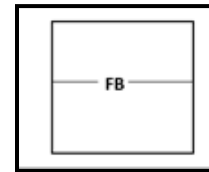
SWPPP or WPCP

Compost Socks must be discussed in Section 500.3 of the SWPPP or Section 30.2 of the WPCP.

Compost Socks

SC-11





Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☒
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

Flexible sediment barriers are synthetic alternatives to fiber rolls, compost socks, and straw bale barriers. Flexible sediment barriers consist of a geosynthetic fabric with a urethane foam-filled core and a fabric apron that helps to prevent undermining and scour. These synthetic linear sediment barriers are generally more robust sediment controls than standard fiber rolls, and may be appropriate for continuous use in stormwater collection areas.

Appropriate Applications

Along the perimeter of a project.

As check dams in ditches, channels, or other stormwater collection areas.

Down-slope of exposed soil areas.

At operational storm drains as a form of inlet protection.

Around temporary stockpiles.

On either paved surfaces or soil.

As a linear sediment control for SC-10 “Temporary Drain Inlet Protection.”

Limitations

Frequent maintenance is required if sediment-laden discharges are upstream of the BMP to maintain it operational.

Standards and Specifications

General Requirements

Flexible sediment barriers must comply with Standard Specifications Sections 13-10.02I and 13-10.03H.

Flexible sediment barriers consist of:

- A urethane foam-filled core.
- Geosynthetic fabric cover and flap.
- Triangular, circular, or square cross section.
- Vertical height of at least 5 inches after installation.
- Horizontal flap at least 8 inches in width.
- Length of at least 4 feet per unit.
- Ability to interlock separate units into a long barrier such that water will not flow between units.

Geosynthetic fabric for flexible sediment barriers covers must have:

- Minimum grab break load of 200 lbs., per ASTM D4632.
- Minimum apparent elongation of 15%, per ASTM D4632.
- Average water flow rate of 100-150 gallons per minute per square foot, per ASTM D4491.
- Minimum permittivity of 0.05 l/sec, per ASTM D4491.
- Maximum apparent opening size of the 40 U.S. standard sieve size, per ASTM D4751.
- Minimum ultraviolet radiation resistance of 70% retained grab breaking load at 500 hours of exposure, per ASTM D4355.

Submit a certificate of compliance for flexible sediment barriers.

Installation

Remove obstructions, including rocks, clods, and debris greater than 1 inch in diameter, from the ground.

Secure flexible sediment barriers to pavement with:

1-inch concrete nails, 1-inch washers, and solvent-free adhesive,

Gravel-filled bags, or

A combination of both of the above methods.

Secure flexible sediment barriers to soil with 6-inch nails and 1-inch washers.

Secure connection points of two adjacent sections of flexible sediment barriers with 2 nails.

Do not pierce the foam core of the barrier with nails.

Maintenance and Inspection

Inspect flexible sediment barriers before and after each rainfall event, and weekly year round.



Maintain a flexible sediment barriers to provide sediment-holding capacity and to reduce concentrated flow velocities.

Repair or adjust the flexible sediment barriers if rills or other evidence of concentrated runoff occur beneath it.

Repair or replace split, torn, or unraveled material. Add or replace posts, stakes, or fasteners as needed to prevent sagging or slumping.

Reattach any flexible sediment barriers that detaches from the pavement.

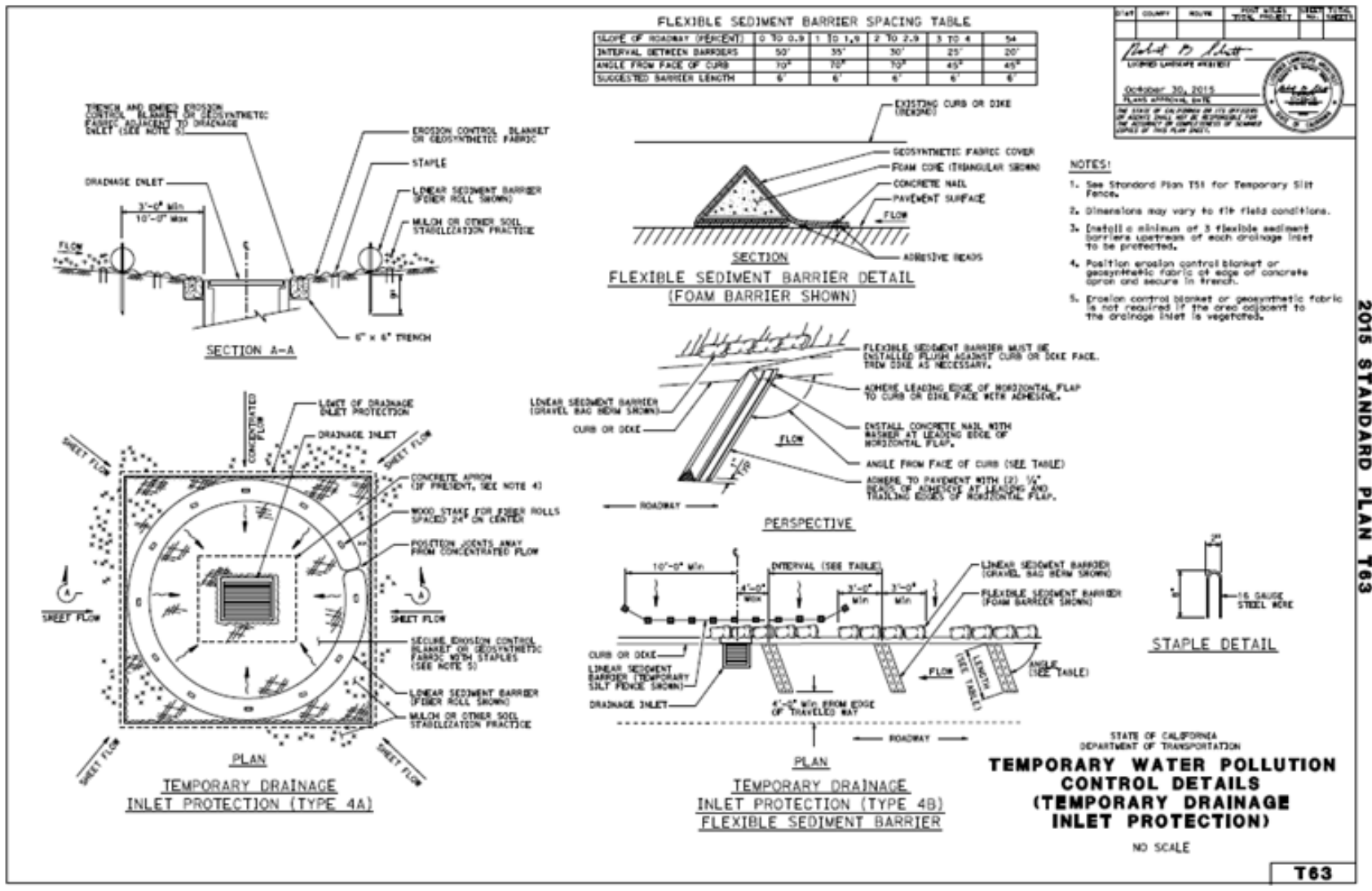
Remove sediment deposits if the sediment exceeds 1/3 of the height above the ground behind a foam barrier.

SWPPP or WPCP

Remove Flexible sediment barriers must be discussed in Section 500.3 of the SWPPP or Section 30.2 of the WPCP.

Flexible Sediment Barrier

SC-12



Section 5

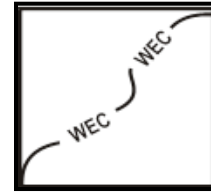
Wind Erosion Control BMP

5.1 Wind Erosion Control

Wind erosion control consists of applying water or other dust palliatives as necessary to prevent or alleviate dust nuisance. Wind erosion control BMPs are shown in Table 5-1.

Table 5-1. Wind Erosion Control BMPs	
ID	BMP Name
WE-1	Wind Erosion Control

Other BMPs that are sometimes applied to disturbed soil areas to control wind erosion are BMPs SS-3 through SS-7, shown in Section 3 of this Manual; BMP TC-2, shown in Section 6; and BMP NS-7, shown in the Section 7. The remainder of this Section describe the working details for the Wind Erosion Control BMP.



Standard Symbol

BMP Objectives	
Soil Stabilization	☒
Sediment Control	☒
Tracking Control	☐
Wind Erosion Control	☒
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

Wind erosion control consists of applying water or other dust palliatives as necessary to prevent or alleviate erosion by the forces of wind. Dust control must be applied in accordance with Caltrans standard practices. Covering of small stockpiles or areas is an alternative to applying water or other dust palliatives; see SS-7 for “Temporary Cover and Rolled Erosion Control Products”

Must comply with local agencies such as Air Quality Management District’s requiring dust control plans or dust control permits as well as any Air Clean Act requirements.

Appropriate Applications

This practice is generally implemented on all exposed soils subject to wind erosion.

Limitations

Effectiveness depends on soil, temperature, humidity and wind velocity.

Chemically treated subgrades could cause soil to become water repellant, preventing infiltration or the long-term re-vegetation of the site.

Standards and Specifications

Standard Specification Section 10-5 contains general requirements for “Dust Control.”

Effective dust control is accomplished by applying dust palliatives, temporary Soil Stabilization BMPs, Tracking Controls and managing stockpiles.

“Dust Palliatives” are covered under Section 18 of the Standard Specifications. Acceptable dust palliatives include water, dust control binders, and dust suppressants. Dust control binders must comply with specifications for tackifier. Dust suppressants include petroleum-based organic product, nonpetroleum-based organic product, hygroscopic product, and synthetic polymer emulsion.

If a dust suppressant or tackifier is used, submit a Dust Treatment Plan. Submit a certificate of compliance for dust suppressants, tackifiers, and fibers.

Identify and stabilize key access points with the use of Tracking Control BMPs.

Minimize the impact of dust by anticipating the direction of prevailing winds.

Temporary soil stabilization BMPs, such as SS-3 “Hydraulic Mulch”, SS-4 “Hydroseed”, SS-5 “Soil Binders”, also provide wind erosion control benefits.

Ensure proper implementation of BMPs WM-3, “Stockpile Management,” and SC-7, “Street Sweeping,” as these BMPs provide wind erosion control benefits.

Ensure that water is applied by means of pressure-type distributors or pipelines equipped with a spray system or hoses and nozzles to ensure even distribution.

All distribution equipment should be equipped with a positive means of shutoff.

Chemical dust suppression products could have environmental water quality impacts. Depending on the product and the time of application, water quality sampling for non-visible pollutants should be assessed when a storm even is forecasted.

For chemical or petroleum based organics stabilization, there are many products available. These products should not create any adverse effects on stormwater, plant life, groundwater and should meet all applicable regulatory requirements including inspection, documentation, monitoring and reporting requirements.

Unless water is applied by means of pipelines, at least one mobile unit should be available at all times to apply water or dust palliative to the project.

If reclaimed water is used, the sources and discharge must meet California Department of Health Services water reclamation criteria and the RWQCB requirements. Non-potable water must not be conveyed in tanks or drain pipes that will be used to convey potable water and there must be no connection between potable and non-potable supplies. Non-potable tanks, pipes and other conveyances must be marked “NON-POTABLE WATER - DO NOT DRINK.”

Appendix B of this Manual includes additional information on selecting temporary soil stabilization products that could be used for Wind Erosion Control.

Maintenance and Inspection

Check areas where wind erosion controls have been implemented daily for erosion and visible dust.

Most water-based dust control measures require frequent application. Obtain vendor or independent information on longevity of chemical dust suppression.

SWPPP or WPCP

Wind Erosion Control must be discussed in Section 500.3.5 of the SWPPP or Section 30.2.4 of the WPCP.

Section 6

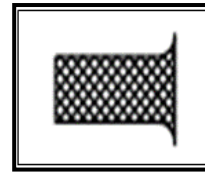
Tracking Control BMP

6.1 Tracking Control

Tracking control consists of preventing or reducing vehicle tracking from entering a storm drain or watercourse. Tracking control BMPs are shown in Table 6-1.

Table 6-1. Tracking Control BMPs	
ID	BMP Name
TC-1	Temporary Construction Entrance/Exit
TC-2	Temporary Construction Roadway
TC-3	Entrance/Outlet Tire Wash

The remainder of this section describe the working details for the tracking control BMPs.



Standard Symbol

BMP Objectives	
Soil Stabilization	☒
Sediment Control	☐
Tracking Control	☒
Wind Erosion Control	☒
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

A temporary construction entrance/exit is defined by a point of entrance/exit to a construction site that is stabilized to reduce the tracking of mud and dirt onto public roads by construction vehicles.

Appropriate Applications

Where dirt or mud can be tracked onto public roads.

Adjacent to water bodies.

Where poor soils are encountered.

Where dust is a problem during dry weather conditions.

Limitations

Site conditions will dictate design and need.

Limit the points of entrance/exit to the construction site.

Limit speed of vehicles to control dust.

Standards and Specifications

General Requirements

Temporary construction entrance/exit must comply with Standard Specification Section 13-7.03 Temporary Construction Roadways and Entrances.



Corrugated steel panels must be pressed or shop welded. They should have a slot or hook for coupling the panels together.

Class 8 RSP fabric shall be used to line temporary construction entrance/exit. Do not drive on the fabric until the rock is spread. Repair damaged fabric by placing new fabric over the damaged area with at least an 18-inch overlap on all edges.

Type A rock should be used for a Type 1 temporary construction entrance/exit. Type A rock must comply with Section 13-7.03B (2) of the Standard Specifications.

Type B rock should be used for a Type 2 temporary construction entrance/exit. Type B rock must comply with Section 13-7.03B (2) of the Standard Specifications.

Submit details for alternative construction entrances at least 5 business days before installation. This may include alternatives for the sump and corrugated steel panels or to eliminate the sump.

Installation

Prepare the location for the temporary construction entrance/exit as follows:

- Remove vegetation and clear debris.
- Grade the ground to a uniform plane.
- Remove sharp objects that could damage the fabric.
- Compact the top 1.5 feet of soil to at least 90 percent relative compaction.

Construct the temporary construction entrance/exit as follows (standard plans attached below):

- Place the fabric along the length of the construction entrance/exit.
- Overlap fabric ends by at least 12 inches.
- Cover the fabric with rock within 24 hours.
- Spread rock over the fabric in the direction of traffic.
- Keep a 6-inch layer of rock over the fabric to prevent damage from the spreading equipment.

For a Type 2 temporary construction entrance/exit, place rock under the corrugated steel panels. Use at least 6 corrugated steel panels for each entrance. Couple the panels together to prevent movement.

If a sump is used, install it within 20 ft of the temporary construction entrance/exit.

Other Considerations

Implement BMP SC-7, "Street Sweeping" as required under Section 13-4.03F and 13-7 of the Standard Specifications.

Require all employees, subcontractors, and suppliers to utilize the temporary construction entrance/exit. If the construction entrance/exit has metal plates as part of the BMP, all vehicles must be required to utilize them.

Route runoff from temporary construction entrances/exits through a sediment-trapping device before discharge.

Design a temporary construction entrance/exit to support the heaviest vehicles and equipment that will use it.



The use of asphalt concrete (AC) grindings is not allowed (high potential for leaching hydrocarbons) unless it complies with Section 6.8 of the 2016 Caltrans SWMP. Designate combination or single purpose entrances and exits to the construction site to maintain smooth flow of traffic.

Maintenance and Inspection

Inspect before and after each rainfall event, and weekly year-round.

Inspect immediate site access roads daily, implement SC-7, “Street Sweeping” as needed.

Remove aggregate, separate, and dispose of sediment if temporary construction entrance is clogged with sediment.

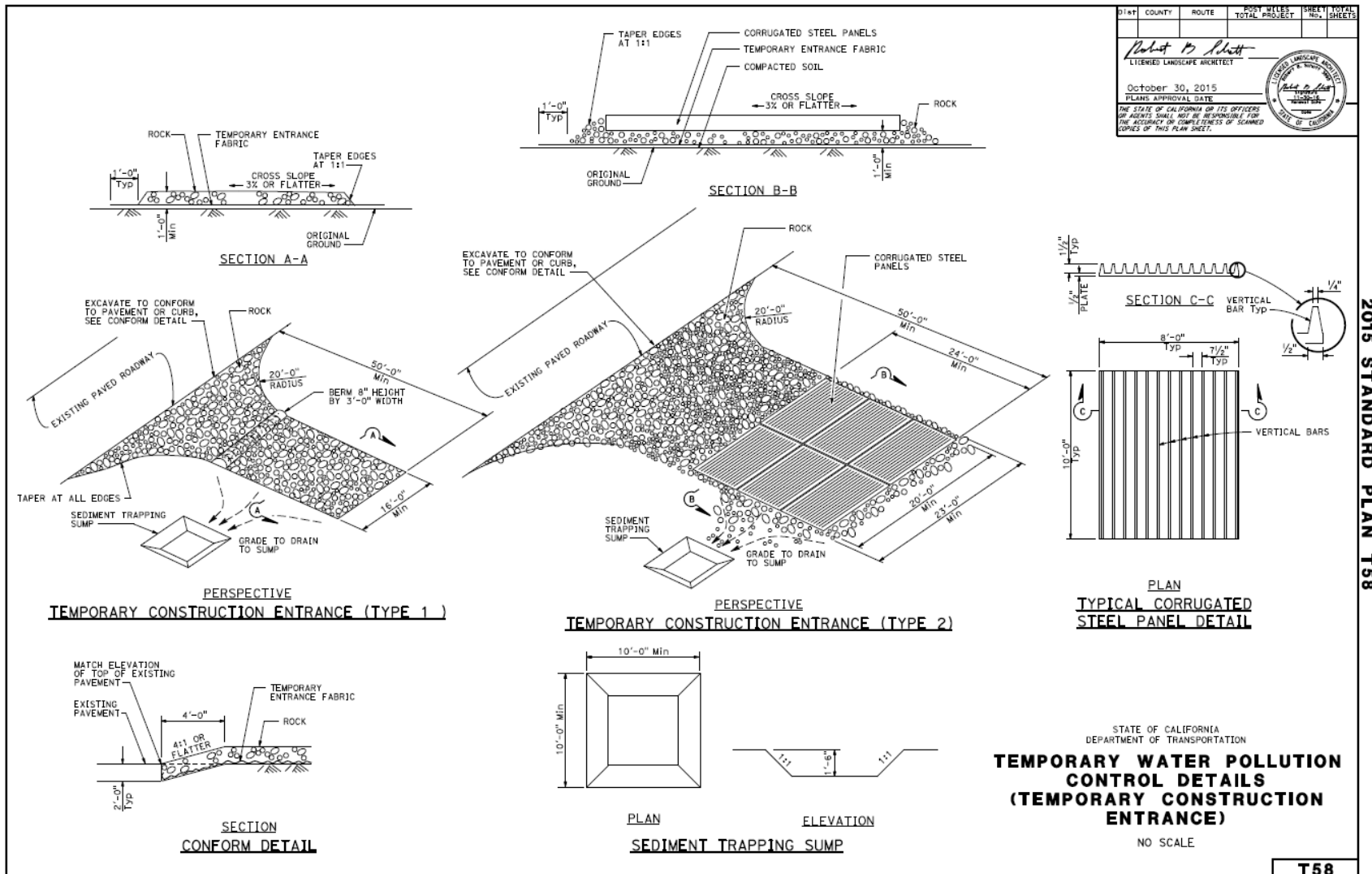
Keep all temporary construction entrance/exit ditches clear.

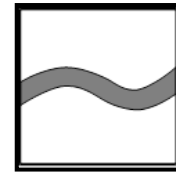
SWPPP or WPCP

Tracking Control BMPs are to be included and discussed in section 500.3.4 or Section 600.2 for SWPPP and Section 30.2.3 of the WPCP.

Temporary Construction Entrance/Exit

TC-1





Standard Symbol

BMP Objectives	
Soil Stabilization	☒
Sediment Control	☐
Tracking Control	☒
Wind Erosion Control	☒
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

A temporary construction roadway is a stabilized access road. It is designed for the control of dust and erosion created by vehicular tracking.

Appropriate Applications

Use construction roadways and short-term detour roads:

- Where mud tracking is a problem during wet weather.
- Where dust is a problem during dry weather.
- When road is adjacent to water bodies.
- Where poor soils are encountered.
- Where there are steep grades and additional traction is needed.

Limitations

Materials will likely need to be removed prior to final grading and stabilization.

Site conditions will dictate design and need.

May not be applicable to very short duration projects.

Limit speed of vehicles to control dust.

Standards and Specifications

General Requirements

Refer to Standard Specification Section 13-7.03 for temporary roadway standards.

Class 10 RSP fabric must be used to line temporary construction roadways. Do not drive on the fabric until the rock is spread. Repair damaged fabric by placing new fabric over the damaged area with at least an 18-inch overlap on all edges.

Type A or Type B rock may be used for temporary construction roadways. Type A and B rock must comply with Standard Specifications Section 13-7.03B(2). Coordinate materials with those used for stabilized construction entrance. Refer to TC-1, “Temporary Construction Entrance/Exit.”

The use of cold mix asphalt, AC grindings, or blast furnace slag for stabilized construction roadway is not allowed (high potential to leach hydrocarbons) unless it complies with Section 6.8 of the 2016 Caltrans SWMP.

Installation

Prepare the location for the temporary roadway as follows:

- Remove vegetation and clear debris.
- Grade the ground to a uniform plane.
- Grade the ground surface to drain in a way that prevents runoff from leaving the construction site.
- Remove sharp objects that could damage the fabric.
- Compact the top 1.5 feet of soil to at least 90% relative compaction.

Construct the temporary construction roadway as follows (standard plans attached below):

- Place the fabric along the length of the roadway.
- Overlap fabric ends by at least 12 inches.
- Cover the fabric with rock within 24 hours.
- Spread rock over the fabric in the direction of traffic.
- Keep a 6-inch layer of rock over the fabric to prevent damage from the spreading equipment.

Other Considerations

Design stabilized access to support the heaviest vehicles and equipment that will use it.

Implement TC-1 “Temporary Construction Entrance/Exit” and TC-3 “Entrance/Outlet Tire Wash” in combination with temporary construction roadway for maximum tracking control.

Maintenance and Inspection

Inspect before and after each rainfall event, and weekly year-round.

Inspect immediate site access roads daily, implement SC-7, “Street Sweeping” as needed.



Temporary Construction Roadway

TC-2

Keep all temporary roadway ditches clear.

When no longer required, remove stabilized construction roadway and re-grade, re-vegetate and repair slopes.

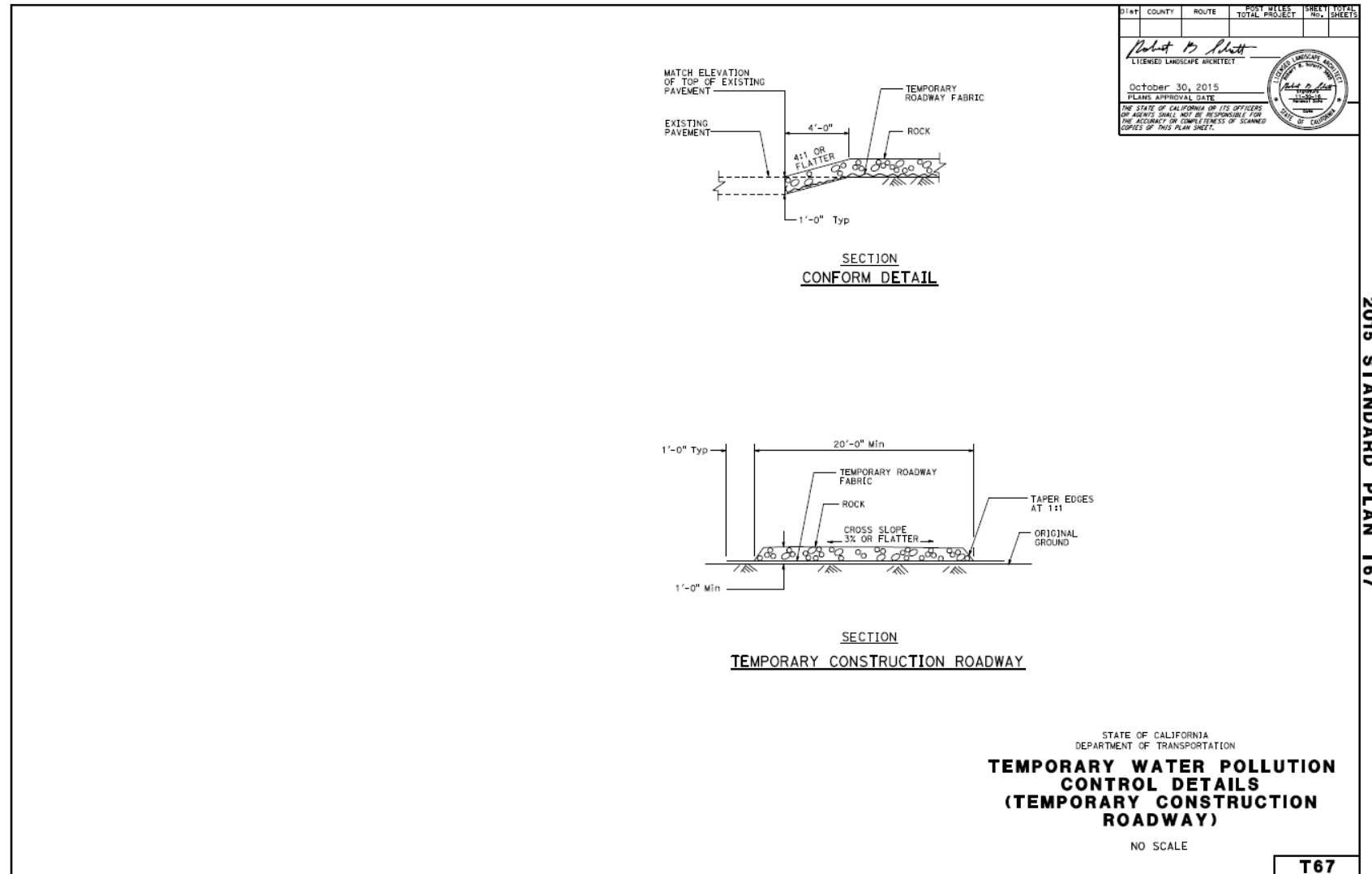
SWPPP or WPCP

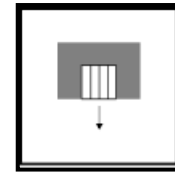
Tracking Control BMPs are to be included and discussed in Section 500.3.4 or Section 600.2 SWPPP or Section 30.2.3 of the WPCP.



Temporary Construction Roadway

TC-2





Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☒
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☐

Definition and Purpose

A tire wash is an area located at stabilized construction access points to remove sediment from tires and undercarriages, and to prevent sediment from being transported onto public roadways.

Appropriate Applications

Tire washes may be used on construction sites where construction vehicles may track dirt and mud onto public roads.

This BMP may be implemented on a project-by-project basis with other BMPs when determined necessary and feasible by the RE.

Limitations

Requires a supply of wash water and way to collect or capture tire wash area runoff.

Requires a turnout or doublewide exit to prevent entering vehicles from driving through the wash area.

Standards and Specifications

Require all employees, subcontractors, and others that leave the site with mud-caked tires and/or undercarriages to use the wash facility.

Incorporate with a temporary construction entrance/exit. See TC-1, “Temporary Construction Entrance/Exit.”

Construct on level ground when possible, on a pad of Type A or Type B rock. Either Class 8 or 10 RSP fabric should be placed below the rock.

Temporary Entrance/Outlet Tire Wash

TC-3

Wash rack must be designed and constructed/manufactured for anticipated traffic loads.

Vehicle wash water is non-stormwater that requires management and disposal. See NS-8, “Vehicle and Equipment Cleaning.”

Provide a drainage ditch that will convey the runoff from the wash area to a sediment trapping device or similar device. The drainage ditch should be of sufficient grade, width, and depth to carry the wash runoff.

Implement BMP SC-7, “Street Sweeping” as needed.

Refer to TC-1, “Temporary Construction Entrance/Exit,” for details regarding design and installation of construction entrance and exits to the project site.

Maintenance and Inspection

Inspect before, daily during extended rain events, after each rain event, and weekly year round.

Inspect immediate site access roads daily, implement SC-7, “Street Sweeping” as needed.

Remove accumulated sediment in wash rack and/or sediment trap to maintain system capacity and performance.

Inspect routinely for damage and repair as needed. Document non-stormwater (sediment trapping device or similar device) in appropriate inspection form.

SWPPP or WPCP

Temporary Entrance/Outlet Tire Wash is to be included and discussed in section 500.3.4 or Section 600.2 for a SWPPP or Section 30.2.3 of the WPCP.



Section 7

Non-Storm Water Management BMP

7.1 Non-Storm Water Management

Non-stormwater management (BMPs) are source control BMPs that prevent pollution by limiting or reducing potential pollutants at their source before they come in contact with stormwater. These practices involve day-to-day operations of the construction site and are usually under the control of the Contractor. These BMPs are also referred to as “good housekeeping practices”, which involve keeping a clean, orderly construction site.

Table 7-1 lists the non-stormwater management BMPs. It is important to note that all these BMPs have been approved by Caltrans for statewide use and they must be implemented depending on the conditions/applicability of deployment described as part of the BMP.

Table 7-1. Non-Stormwater Management BMPs	
ID	BMP Name
NS-1	Water Conservation Practices
NS-2	Dewatering Operations
NS-3	Paving, Sealing, Sawcutting and Grinding Operations
NS-4	Temporary Stream Crossing
NS-5	Clear Water Diversion
NS-6	Illegal Connection and Illicit Discharge Detection and Reporting
NS-7	Potable Water/Irrigation
NS-8	Vehicle and Equipment Cleaning
NS-9	Vehicle and Equipment Fueling
NS-10	Vehicle and Equipment Maintenance
NS-11	Pile Driving Operations
NS-12	Concrete Curing
NS-13	Material and Equipment Use Over Water
NS-14	Concrete Finishing
NS-15	Structure Demolition/Removal Over or Adjacent to Water

The remainder of this Section describe the working details for each of the non-stormwater management BMPs.



Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☒
Materials and Waste Management	☐

Definition and Purpose

Water conservation practices are construction methods that minimize the use of water onsite or use water in a manner that avoids causing runoff, erosion and/or the discharge of pollutants to the storm drain system or receiving waters. Proper utilization of this BMP reduces or prevents non-stormwater discharges.

Appropriate Applications

Water conservation practices are implemented on all construction sites wherever water is used.

Limitations

If not implemented correctly, discharges may trigger reporting and monitoring requirements and delay construction work.

Standards and Specifications

Keep water equipment in good working condition.

Ensure tracking controls are implemented in, near and around water truck filling areas.

Repair water leaks promptly.

Authorization is required for activities that could potentially discharge water into a storm drain system or receiving waters.

Avoid using water to clean construction areas. Do not wash paved areas with water. Paved areas and roadways should be swept and vacuumed in accordance with SC-7 “Street Sweeping.”

Apply water for dust control in accordance with Standard Specifications Section 10-4 Water Usage and BMP WE-1, “Wind Erosion Control.”

Direct construction water runoff to areas where it can infiltrate into the ground or be collected and reused.

Manage run-on to minimize contact with job site.

Retain water spilled while filling water trucks within the designated water truck filling areas. Prevent tracking from water trucks and other equipment.

Report discharges to the RE and the WPC Manager immediately.

Maintenance and Inspection

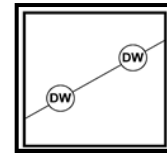
Inspect water equipment areas at least weekly, prior to a forecasted rain event, daily during extended rain events and post-storm events.

Inspect non-stormwater BMPs daily when non-stormwater operations are ongoing.

Repair water equipment as needed.

SWPPP or WPCP

Water Conservation Practices must be discussed in Section 500.3.5 of the SWPPP or Section 30.3.1 of the WPCP.



Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☒
Materials and Waste Management	☐

Definition and Purpose

Dewatering Operations are practices that manage the discharge of pollutants when non-stormwater and accumulated precipitation (stormwater) must be removed from a work location so that construction work may be accomplished.

Appropriate Applications

These practices are implemented for the collection and discharge of non-stormwater and stormwater (accumulated rain water) from excavations or temporary containment facilities. Non-stormwater includes, but is not limited to, groundwater, dewatering of piles, water from cofferdams, water diversions, and water used during construction activities that must be removed from a work area.

Practices identified in this section are also appropriate for implementation when managing the removal of accumulated precipitation (stormwater) from depressed areas at a construction site.

Stormwater mixed with non-stormwater should be managed as non-stormwater.

Limitations

Dewatering operations for non-stormwater will require, and must comply with, applicable local permits, project-specific permits, and regulations.

Site conditions will dictate design and use of dewatering operations.

Avoid dewatering discharges where possible by infiltrating, reusing the water for dust control, etc.

Standards and Specifications

General Requirements

Dewatering shall be conducted in accordance with the Caltrans Field Guide to Construction Site Dewatering Manual and Standard Specification Section 13-4.03G.

A dewatering and discharge work plan shall be submitted at least 15 days before the start of dewatering activities detailing the location of dewatering and discharge activities, quantity of water, equipment, and discharge point. The dewatering and discharge work plan must conform to Standard Specifications Section 13-4.01C.

Dewatering discharges must not cause erosion, scour, or sedimentation that could impact natural bedding materials.

Discharge the water within the project limits. Dispose of the water if it cannot be discharged within project limits due to site constraints or contamination.

Do not discharge stormwater or non-stormwater that has an odor, discoloration other than sediment, an oily sheen, or foam on the surface. Immediately notify the RE upon discovering any such condition.

The RWQCB may require a separate NPDES permit for a dewatering operation. These permits will have specific testing, monitoring, and discharge requirements.

Discharges must comply with regional and watershed-specific discharge requirements.

Additional permits or permissions from other agencies may be required for dewatering cofferdams or diversions.

Dewatering records shall be kept with the SWPPP or WPCP and maintained for a minimum of 3 years after the construction project is terminated.

The controls discussed in this BMP address sediment only. If the presence of polluted water with hazardous substances is identified in the contract, the contractor shall implement dewatering pollution controls as required by the contract documents. If the quality of water to be removed by dewatering is not identified as polluted in the contract documents, but is later determined by observation or testing to be polluted, the contractor shall notify the RE and comply with Standard Specifications Section 4-1.06, "Differing Site Conditions."

Sediment Treatment

A variety of methods can be used to treat water during dewatering operations from the construction site. The size of particles present in the sediment and/or RWQCB Dewatering Permit or receiving water limitations on sediment are key considerations for selecting sediment treatment option(s); in some cases, the use of multiple devices may be appropriate.

Refer to the Sediment Treatment Options described in Appendix B of the Field Guide to Construction Site Dewatering to determine the optimal method to achieve sediment removal.



Refer to the applicable project dewatering and/or stormwater permit for monitoring and sampling forms and requirements.

Maintenance and Inspection

Inspect dewatering operation areas at least weekly, prior to a forecasted rain event, daily during extended rain events and post-storm events.

Accumulated sediment removed during the maintenance of a dewatering device may be disposed of outside the right-of-way in conformance with Standard Specifications Section 14-10 Solid Waste Disposal and Recycling.

Accumulated sediment that is commingled with other pollutants must be disposed of in accordance with all applicable laws and regulations.

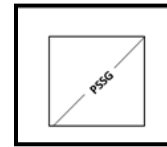
The WPC Manager must take immediate action to prevent non-stormwater discharges from being discharged.

SWPPP or WPCP

Dewatering Operations must be discussed in Section 500.4.1 of SWPPP and specific sample collection, collection and parameters in Section 700.2.3.1 if required by a specific RWQCB Dewatering Permit or Section 30.3.1 of the WPCP.

Paving, Sealing, Sawcutting, and Grinding Operations

NS-3



Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☒
Materials and Waste Management	☒

Definition and Purpose

Procedures and practices for conducting paving, sealing, sawcutting, and grinding activities to minimize the transport of pollutants to the storm drain system or receiving water body.

Appropriate Applications

These procedures are implemented where operations such as paving, surfacing, resurfacing, grinding, coring, grooving, sealing and sawcutting generate spoils, residue, or process water that may pollute storm water runoff or discharge to the storm drain system or receiving water body.

Limitations

Activities related to paving, sealing, sawcutting, grooving, and grinding operations should be limited when precipitation is forecasted to prevent the triggering for visible and non-visible pollutant monitoring.

Discharges of freshly paved surfaces can raise pH and trigger permit violations.



Paving, Sealing, Sawcutting, and Grinding Operations

NS-3

Standards and Specifications

General Requirements

Refer to Standard Specifications Section 13-4.03E (7) Paving, Sealing, Sawcutting, Grooving, and Grinding Activities.

Do not allow the following materials to enter storm drain system and receiving waters: cementitious material, asphaltic material, aggregate or screenings, sawcutting, grooving, and grinding residue, pavement chunks, shoulder backing, methacrylate resin, and sandblasting residue. This list is not exhaustive.

Drainage inlets shall be protected and linear sediment barriers (such as silt fences, gravel bag berms, or fiber rolls) shall be used to protect receiving waters during operations related to paving, sealing, sawcutting, or grinding.

Drainage inlets and manholes shall be protected during application of seal coat, tack coat, slurry seal, and/or fog seal. Refer to SE-10, "Temporary Drainage Inlet Protection."

Whenever precipitation is forecasted, limit paving, sawcutting, and grinding to places where runoff can be captured. Grinding or grooving of pavement shall not be conducted when precipitation is forecasted unless runoff can be captured.

Seal coat, tack coat, slurry seal, or fog seal shall not be applied when precipitation is forecasted during the application or curing period.

Slurry shall be removed with a vacuum immediately after it is produced and shall be prevented from running off the pavement or into lanes open to traffic.

The residue from grooving and grinding activities shall be collected with a vacuum attachment on the grinding machine and shall be prevented from flowing across the pavement. See also WM-8, "Concrete Waste Management," and WM-10, "Liquid Waste Management."

Material removed from existing roadways may be stockpiled, if allowed, away from drainage inlets and receiving waters in accordance with BMP WM-3, "Stockpile Management" and Standard Specification 13-4.03C(3) Stockpile Management.

Drip pans or absorbent materials shall be placed under paving equipment when not in use. Refer to WM-4, "Spill Prevention and Control." Equipment shall be cleaned in accordance with NS-8, "Vehicle and Equipment Cleaning."

Do not coat asphalt trucks and equipment with substances that contain soap, foaming agents, or toxic chemicals.

Asphalt Concrete and Concrete Pavement Handling

Prevent sand and gravel from entering streets, storm drains, and receiving waters.



Paving, Sealing, Sawcutting, and Grinding Operations

NS-3

Substances used to coat asphalt transport trucks, asphalt trucks, and asphalt spreading equipment shall not contain soap, foaming agents, or toxic chemicals.

Asphalt spoils must be recycled or disposed of in accordance with WM-5, "Solid Waste Management," and/or WM-6, "Hazardous Waste Management."

AC and PCC grindings, pieces, or chunks approved by the RE for reuse in embankments or shoulder backing shall not be at risk of entering storm drain systems or receiving waters.

Temporarily protect inlets and receiving waters until the structure is stabilized or permanent controls are in place.

The reuse of AC or PCC grindings, pieces, or chunks as road base must be placed at least five feet above the seasonal high groundwater elevation with the approval of the RE. Shoulder backing containing Recycled Asphalt Pavement (RAP) shall not be placed within 100 feet measured horizontally from a culvert, watercourse, or bridge and must comply with the 2016 SWMP.

During chip seal application and sweeping operations, petroleum or petroleum covered aggregate must not be allowed to enter storm drains or receiving waters. Temporarily protect inlets and receiving waters until stabilized.

Clean asphalt-coated equipment off-site whenever possible. When cleaning dry, hardened asphalt from equipment, manage hardened asphalt debris in accordance with WM-5, "Solid Waste Management," and/or WM-6, "Hazardous Waste Management," and NS-8 "Vehicle and Equipment Cleaning" whichever is applicable.

Allow aggregate rinse to settle. Then, either allow rinse water to dry in a temporary pit as described in WM-8, "Concrete Waste Management," or dispose in accordance with WM-5, "Solid Waste Management."

Thermoplastic Striping and Pavement Markers

Contractor shall not pre-heat, transfer, or load thermoplastic within 50 feet of drainage inlets or receiving waters.

Do not unload, transfer, or load bituminous material for pavement markers within 50 feet of drainage inlets or receiving waters.

All thermoplastic striper and pre-heater equipment shutoff valves shall be inspected to ensure that they are working properly to prevent thermoplastic from leaking.

The pre-heater shall be filled carefully to prevent splashing or spilling of hot thermoplastic. Leave six inches of space at the top of the pre-heater container when filling thermoplastic to allow room for material to move when the vehicle is deadheaded.



Paving, Sealing, Sawcutting, and Grinding Operations

NS-3

Melting tanks shall be loaded with care, a minimum of six inches of freeboard in case of splashing when vehicle is deadheaded. When servicing or filling melting tanks, ensure all pressure is released before removing lids to avoid spills.

Immediately remove drips, overspray, improper markings, paint, and thermoplastic tracked by traffic with an authorized method.

Collect and dispose of bituminous material from the roadway after removal of markers in accordance with WM-5, “Solid Waste Management.”

Clean truck beds daily of loose debris and melted thermoplastic. When possible, recycle thermoplastic material. Thermoplastic waste shall be disposed of in accordance with BMP WM-5, “Solid Waste Management” and/or WM-6, “Hazardous Waste Management, as applicable.

Maintenance and Inspection

Inspect and maintain machinery and BMPs regularly to minimize leaks and drips.

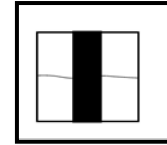
Ensure that employees and subcontractors are implementing appropriate measures during paving operations.

If project operations trigger the IGP (industrial operations located within project limits regardless of whether the facility is within or outside Caltrans’ right-of-way and outside Caltrans’ right-of-way but within project limits), ensure that any run-on or run-off from IGP activities does not have potential to create pollution onto Caltrans right-of-way. Refer to 2016 SWMP Section 7.2 for additional guidance.

SWPPP or WPCP

Paving, Sealing, Sawcutting and Grinding Operations must be discussed in Section 500.4 of the SWPPP or Section 30.3.1 of the WPCP.





Standard Symbol

BMP Objectives	
Soil Stabilization	☒
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☒
Materials and Waste Management	☐

Definition and Purpose

A temporary stream crossing is a structure placed across a stream or water body that allows vehicles to cross during construction and minimize, reduce, or manage erosion and downstream sedimentation caused by the vehicles.

Appropriate Applications

Where appropriate regulatory permits have been secured and requirements strictly followed.

Where construction equipment or vehicles need to frequently cross a waterway.

When alternate access routes impose significant constraints.

When crossing perennial streams or waterways causes significant erosion.

Where construction activities will not last longer than one year.

Limitations

Typically, stream crossings require regulatory permits such as RWQCB 401 Certification, U.S. Army Corps of Engineers 404 permit and approval by California Department of Fish and Wildlife.

If numerical-based water quality standards are mentioned in any of these regulatory permits, monitoring and water quality sampling may be required and must comply with Standard Specification 13-1.01C (4) Water Quality Monitoring or the contract special provisions. If monitoring related to these numerical-based water quality standards is not addressed in the contract documents, contact the RE.

Ensure that project specific requirements from regulatory permits for the installation, removal or restoration of creek banks are fully implemented.

Will usually disturb the waterway during installation and removal.

Installation may require dewatering or temporary diversion of the stream. See NS-2, “Dewatering Operations” and NS-5, “Clear Water Diversion.”

May become a constriction in the waterway, which can obstruct flood flow and cause flow backups or washouts. If improperly designed, flow backups can increase the pollutant load through washouts and scouring.

Use of natural or other gravel in the stream for construction of Cellular Confinement System (CCS) ford crossing will be contingent upon approval by fisheries agencies.

Ford crossings may degrade water quality due to contact with vehicles and equipment.

CCS should not be used in excessively high or fast flows.

Upon completion of construction activities, CCS blocks must be removed from stream.

Standards and Specifications

General Requirements

Location of the temporary stream crossing shall address:

Site selection where erosion potential is low.

Areas where the side slopes from highway runoff will not spill into the side slopes of the crossing.

The following types of temporary stream crossings shall be considered:

- Culverts - Used on perennial and intermittent streams.
- Fords - Appropriate during the dry season in arid areas. Used on dry washes and ephemeral streams, and low flow perennial streams. CCS, a type of ford crossing is also appropriate for use in streams.
- Bridges - Appropriate for streams with high flow velocities, steep gradients and/or where temporary restrictions in the channel are not allowed.

Design and installation requires knowledge of stream flows and soil strength. Designs shall be prepared under direction of, and approved by, a registered civil and/or structural engineer. Both hydraulic and construction loading requirements shall be considered with the following:

- Comply with the requirements for culvert and bridge crossings, as contained in the Caltrans Highway Design Manual, particularly if the temporary stream crossing will remain during high flow periods.
- Provide stability in the crossing and adjacent areas to withstand the design flow. The design flow and safety factor shall be selected based on careful evaluation of the risks due to over topping, flow backups, or washout.

Temporary Stream Crossing

NS-4

- Avoid using oil, AC or other potentially hazardous waste materials for the temporary traveled surface over the stream crossing.

Construction Considerations

Stabilize construction roadways, adjacent work area and stream bed against erosion.

Construct during dry periods to minimize stream disturbance and reduce costs.

Construct at or near the natural elevation of the stream bed to prevent potential flooding upstream of the crossing.

Install temporary sediment control BMPs in accordance with sediment control BMPs presented in Section 4 to minimize embankment scour due to flow conditions.

Vehicles and equipment shall not be driven, operated, fueled, cleaned, maintained, or stored in the wet or dry portions of a water body where wetland vegetation, riparian vegetation, or aquatic organisms may be destroyed, except as authorized by the construction project regulatory permits, as necessary to complete the work.

Temporary water body crossings and encroachments shall be constructed to minimize scour. Cobbles used for temporary water body crossings or encroachments shall be clean, rounded river cobble.

The exterior of vehicles and equipment that will encroach on the water body within the project shall be maintained free of grease, oil, fuel, and residues.

Disturbance or removal of vegetation shall not exceed the minimum necessary to complete operations. Precautions shall be taken to avoid damage to vegetation. Disturbed vegetation shall be replaced with the appropriate soil stabilization measures. Appropriate use of ESA fencing should be conducted and maintain in accordance with SS-2 "Preservation of Existing Vegetation."

Riparian vegetation, when removed pursuant to the provisions of the work, shall be cut off no lower than ground level to promote rapid re-growth. Access roads and work areas built over riparian vegetation shall be covered by a sufficient layer of clean river run cobble to prevent damage to the underlying soil and root structure. The cobble shall be removed upon completion of project activities.

Any temporary artificial obstruction placed within flowing water shall only be built from material, such as clean gravel, that will cause little or no siltation.

Drip pans shall be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is planned to be idle for more than one hour.

Specific Considerations

Culverts are relatively easy to construct and able to support heavy equipment loads.

Fords are the least expensive of the crossings, with maximum load limits.

Temporary fords are not appropriate if construction will continue through a period of high flows if thunderstorms are likely, or if the stream is perennial.



CCS crossing structures consist of clean, washed gravel and cellular confinement system blocks. CCS are appropriate for streams that would benefit from an influx of gravel; for example, salmonid streams, streams or rivers below reservoirs, and urban, channelized streams. Many urban stream systems are gravel-deprived due to human influences, such as dams, gravel mines, and concrete channels.

CCS allow designers to use either angular or naturally-occurring, rounded gravel, because the cells provide the necessary structure and stability. In fact, natural gravel is optimal for this technique, because of the habitat improvement it will provide after removal of the CCS.

A gravel depth of 6 to 12 inches for a CCS structure is sufficient to support most construction equipment.

An advantage of a CCS crossing structure is that relatively little rock or gravel is needed, because the CCS provides the stability.

Bridges are generally more expensive to design and construct, but provide the least disturbance of the stream bed and constriction of the waterway flows.

Maintenance and Inspection

Periodic removal of debris behind fords, in culverts, and under bridges.

Replacement of lost protective aggregate from inlets and outlets of culverts.

Removal of temporary crossing promptly when it is no longer needed.

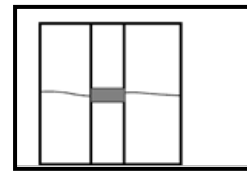
Inspection shall, at a minimum, occur weekly and after each significant rainfall, and include:

- Checking for blockage in the channel, debris buildup in culverts or behind fords, and under bridges.
- Checking for erosion of abutments, channel scour, riprap displacement, or piping in the soil.
- Checking for structural weakening of the temporary crossing, such as cracks, and undermining of foundations and abutments.

The WPC Manager or QSP must ensure that stream crossings do not create potential for sediment laden discharge or other materials onto the waterbody.

SWPPP or WPCP

Temporary Stream Crossing must be discussed in Section 500.4 of the SWPPP or Section 30.3 of the WPCP.



Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☒
Materials and Waste Management	☐

Definition and Purpose

Clear water diversion consists of a system of structures and measures that intercept surface water runoff upstream of a project site, transport it around the work area, and discharge it downstream with minimal water quality degradation from either the project construction operations or the construction of the diversion. Clear water diversions are used to reduce sediment pollution from construction work occurring in or adjacent to water.

Isolation techniques are clear water diversion methods that isolate near shore work from a waterbody. Structures commonly used as part of this system include diversion ditches, berms, dikes, slope drains, rock, gravel bags, wood, sheet piles, aqua barriers, cofferdams, filter fabric or turbidity curtains, drainage and interceptor swales, pipes, or flumes.

Appropriate Applications

A clear water diversion is typically implemented where appropriate permits have been secured and work must be performed in a live stream or water body. Work in jurisdictional waters typically require the following, at a minimum, Clean Water Act Section 404, Clean Water Act Section 401 (RWQCB Water Quality Certification), and Fish and Game Code Section 1600 permits.

Clear water diversions are appropriate for isolating construction activities occurring within or near a water body such as streambank stabilization, or culvert, bridge, pier or abutment installation. They may also be used in combination with other methods, such as clear water bypasses and/or pumps.

Implement SS-12 “Streambank Stabilization” to minimize impacts to streambanks.

Where working areas encroach on live streams, barriers adequate to prevent the flow of muddy water into streams should be constructed and maintained between working areas and streams. During construction of the barriers, muddying of streams should be held to a minimum.

Channel diversions are appropriate for small stream where there is adequate right of way to create a temporary channel around a construction work area, and geosynthetics or rock can be used to handle the shear stresses associated with the expected flows.

Berms are appropriate for small perennial, intermittent, or ephemeral streams with temporary culverts or pipe diversions. Berms may also be used to shift flows to one side or the other within a channel.

Gravel bag berms (SC-6 “Gravel Bag Berms”) are appropriate for smaller streams where the hydraulic forces and water pressure can be adequately addressed with the weight of gravel-filled bags and plastic sheeting. This method results in a cofferdam-like isolation from the receiving water.

Cofferdams are appropriate for small streams and lakes to confine flows to one side, create a dry work area, or to berm entire small streams. Typically, this terminology is used in association with structures at Caltrans, though some inflatable cofferdams may be used for smaller applications.

Pumped diversions are suitable for short-term projects in intermittent and low flow streams. Excavation of a temporary bypass channel, or passing the flow through a pipe (called a “flume”) is appropriate for the diversion of streams less than 20 ft wide, with flow rates less than 100 cfs.

Piped diversions are appropriate for short-term projects with little base flow.

Water quality monitoring must typically be performed before and during in-water work, including the installation, operation, and removal of clear water diversions. Follow the requirements outlined in the Standard Specification or special provisions.

Limitations

Diversion/encroachment activities will usually disturb the waterway during installation and removal of diversion structures.

Specific permit requirements or mitigation measures, such as those required by the U.S. Army Corps of Engineers, California Department of Fish and Wildlife, Federal Emergency Management Agency (FEMA), Regional Water Quality Control Board (RWQCB), etc. may be included in contract documents because of clear water diversion/encroachment activities.

Diversion/encroachment activities may constrict the waterway, obstruct flood flows and cause flooding or washouts. Diversion structures should not be installed without identifying potential impacts to the stream channel.

Diversion or isolation activities should not completely dam streamflow.



The designer should consider the size, depth of water, and risks for temporary stream diversion. Use this BMP and specification for small streams and low risk projects.

Coffer dams and more elaborate systems should be designed by engineering services staff with the appropriate structural background or by the contractor. The design decision and design parameters should be coordinated by the PDT, so that all permitting and highway design requirements are met.

Dewatering and removal may require additional sediment control or water treatment (See NS-2, “Dewatering Operations”).

Heavy equipment driven in wet portions of a water body to accomplish work should be completely clean of petroleum residue, and water levels should be below the gearboxes of the equipment in use, or lubricants and fuels are sealed such that inundation by water should not result in leaks.

Mechanical equipment operated in the water shall not be submerged to a point above any axle of said mechanical equipment.

Excavation equipment buckets may reach out into the water to remove or place fill materials. Only the bucket of the crane/ excavator/backhoe may operate in a water body. The main body of the crane/excavator/backhoe shall not enter the water body, except as necessary to cross the stream to access the work site.

Stationary equipment such as motors and pumps, located within or adjacent to a water body, shall be positioned over drip pans.

Equipment shall not be parked below the high-water mark unless allowed by a regulatory agency permit or approval.

Drip pans shall be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is planned to be idle for more than one hour.

Where possible, avoid or minimize diversion/encroachment impacts by scheduling construction during periods of low flow or when the stream is dry. See also the project special provisions for scheduling requirements.

Scheduling shall also consider seasonal releases of water from dams, fish migration and spawning seasons, and water demands due to crop irrigation.

Materials and equipment should be moved from diversion work area prior to forecasted rain events to prevent non-storm water discharges.

Standards and Specifications

General Requirements

Most small stream diversions can be designed by the district and coordinated with the HQ OHSD. In many cases the diversion can be located on the plan sheet referencing the non-standard specification for Temporary Creek Diversion.

Many projects will have multiple culverts, so it may be appropriate to develop a table of the lump sum costs for each system, this should be provided to the RE to help review the Temporary Creek Diversion System Plan, to help them determine if all needed items are included.

The types of diversion for small to medium sized streams may include:

- Pumped systems
- Temporary culverts
- Inflatable coffer dams (Consult HQ OHSD for specification)

For larger (large rivers, lakes, bays, and ocean areas) temporary creek diversions that have a higher risk to worker safety and a more extensive design is required to address the forces for the depth and flow of the water, the district's structures representative should be consulted for the design (e.g., larger rivers where coffer dams are required). The engineer must consult and follow the Caltrans Engineering Services Shoring Guidance and consult with Construction as the owner of the specification.

- Diversion can be constructed from timber, soil, or steel. But in most cases are designed and constructed with steel sheet piles. Refer to 19-3.03C Cofferdams (sheet piles).
- Guidance: Caltrans Shoring Guide (Engineering Services)
Dewatering: Field Guide to Construction Site Dewatering, NS-2 "Dewatering Operations," and Section 13-4.03G of the Standard Specifications for use with coffer dams or other large in-water work.
- May need to treat or control seepage water prior to discharge, consult appropriate requirements for treatment design needs.

When any artificial obstruction is being constructed, maintained, or placed in operation, sufficient water shall, at all times, be allowed to pass downstream to maintain aquatic life downstream.

Disturbance or removal of vegetation shall not exceed the minimum necessary to complete operations.

Disturbed vegetation shall be replaced with the appropriate soil stabilization measures and in accordance with the project's special provisions.

Riparian vegetation, when removed pursuant to the provisions of the work, shall be cut off no lower than ground level to promote rapid re-growth. Access roads and work areas built over riparian vegetation shall be covered by a sufficient layer of clean river run rock to prevent damage to the underlying soil and root structure. The rock shall be removed upon completion of project activities.

Construct diversion structures with materials free of potential pollutants such as soil, silt, sand, clay, grease, or oil.

Clear water diversions incorporating clean washed gravel may be appropriate for use in salmon spawning streams.

Coordination with a variety of functional units at the Department may be required to implement this BMP.

Design Considerations

Does the construction of the temporary diversion system cause more environmental damage to the riparian, wetland, or 100-year floodplain area, than to construct the project without the diversion BMP? This is a consideration for all projects, but is usually appropriate for short term construction projects for temporary or ephemeral streams, where scheduling of the project when the stream is dry, may be more effective than the construction of a large diversion system in a sensitive environmental area, where construction equipment could disturb fragile vegetation, roots, sensitive species, soil structure, and root systems.

Stream hydrology considerations include: Stream channel geometry, tributary watershed area, stream bed material, and predicted flow rates during construction. Follow methods in HDM Section 810 for the appropriate methods and rates for sizing the temporary diversion system.

Sizing the temporary diversion. In the past many temporary diversion system guidance documents required mandatory minimum return storms for sizing the systems, for example the 2-year, 5-year, or 10-year, 24-hour return period. This can result in temporary diversion system as large as the drainage system they are replacing and result in large impacts to the stream riparian zone, with large disturbed soil areas. Overly conservative approaches for the hydrology sizing to protect the environment can inadvertently cause other impacts to the environment for its construction. Each project should be sized for the appropriate risks and should be based on regulatory restrictions.

In coordination with District Hydraulics, consider the consequences for diversion exceedance including; public and work safety, environment, legal, regulatory permit requirements, costs, space, and schedule.

Hydrology Sizing Methods

The sizing of clear water diversion systems varies by the time of year, local hydrology, and duration of the diversion. If there is a prescriptive storm size in a permit document, then design to the required event size. A 2-year, 24-hour storm event has been used by many as a default event, but more recent studies have shown that this may oversize the system and cause more disturbance in the sensitive stream zone than is necessary.

Diversion structures must be adequately designed to accommodate fluctuations in water depth or flow volume due to tides, storms, flash floods, etc. Careful analysis of the local hydrology history and risk analysis is required to minimize the diversion impacts.

Temporary Diversions/Encroachments

Construct diversion channels in accordance with SS-9, “Earth Dikes/Drainage Swales, and Ditches.”

In high flow velocity areas, stabilize slopes of embankments and diversion ditches using an appropriate liner, in accordance with SS-12 “Streambank Stabilization,” and SS-7, “Plastic Covers & Rolled Erosion Control Products,” or use rock slope protection, as described in Standard Specifications Section 72 2, “Rock Slope Protection.”

Where appropriate, use natural streambed materials such as large cobbles and boulders for temporary embankment/slope protection, or other temporary soil stabilization methods.

Provide for velocity dissipation at transitions in the diversion, such as the point where the stream is diverted to the channel and the point where the diverted stream is returned to its natural channel. See also SS-10, “Outlet Protection/Velocity Dissipation Devices.”

Temporary Dry Construction Areas

When dewatering behind temporary structures to create a temporary dry construction area, such as cofferdams, pass pumped water through a sediment settling device, such as a portable tank, settling basin, or Active Treatment System if necessary, before returning water to the water body; see NS-2, “Dewatering Operations” and Standard Specification 13-8 “Temporary Active Treatment System.”

If the presence of polluted water or sediment is identified in the contract, the contractor shall implement dewatering pollution controls as required by the contract documents. If the quality of water or sediment to be removed while dewatering is not identified as polluted in the contract documents, but is later determined by observation or testing to be polluted, the contractor shall notify the RE and comply with Standard Specifications Section 4-1.06 “Differing Site Conditions.”

Any substance used to assemble or maintain diversion structures, such as form oil, shall be non-toxic and non-hazardous.

Any material used to minimize seepage underneath diversion structures, such as grout, shall be non toxic, non hazardous, and as close to a neutral pH as possible.

Instream Construction Sediment Control

Instream Construction Sediment Control

There are three different options currently available for reducing turbidity while working in a stream or river. The stream can be:

- Isolated from the area in which work is occurring by means of a water barrier.
- The stream can be diverted around the work site through a pipe or temporary channel.
- One can employ construction practices that minimize sediment suspension.
- The highest hazard for sedimentation from instream construction generally occurs when the sediment control structure is being installed and when it is being removed. Generally, the best time to install the stream isolation or diversion structure is when the stream flow is low. Conversely, the optimum time to remove in-stream diversion or isolation structures may be during the rising limb of a storm hydrograph. A probable “worst time” to release high TSS into a stream system with diminishing aquatic habitat might be when the stream flow is very low; summer low flow, for example. During these times, the flow may be low while the biological activity in the stream is very high. On the other hand, the addition of short-term spike in TSS or sediment during a big storm discharge might have a relatively low impact on the aquatic habitat or turbidity because the stream is already turbid, and the stream energy is capable of transporting both suspended solids, and large quantities of bedload through the system.

Techniques to Minimize Total Suspended Solids (TSS)

Padding - Padding laid in the stream below the work site may trap some solids that are deposited in the stream during construction. After work is done, the padding is removed from the stream, and placed on the bank to assist in revegetation.

Clean, washed gravel - Using clean, washed gravel decreases solid suspension, as there are fewer small particles deposited in the stream.

Excavation using a large bucket - Each time a bucket of soil is placed in the stream a portion is suspended. Approximately the same amount is suspended whether a small amount of soil is placed in the stream, or a large amount. Therefore, using a large excavator bucket instead of a small one, will reduce the total amount of soil that washes downstream.

Use of dozer for backfilling - Using a dozer for backfilling instead of a backhoe follows the same principles – the fewer times soil is deposited in the stream, the less soil will be suspended.

Partial dewatering with a pump - Partially dewatering a stream with a pump reduces the amount of water, and thus the amount of water that can suspend sediment.

Washing Fines

Partial Washing fines is an “in-channel” sediment control method, which uses water, either from a water truck or hydrant, to wash any stream fines that were brought to the surface of the channel bed during restoration, back into the interstitial spaces of the gravel and cobbles. This technique is useful in both intermittent or ephemeral stream channels with gravelly to cobbly substrate and may be useful in perennial streams just prior to removing isolation structures.

The purpose of this technique is to reduce or eliminate the discharge of sediment from the channel bottom during the first seasonal flows, or “first flush.” Sediment should not be allowed into stream channels; however, occasionally in-channel restoration work will involve moving or otherwise disturbing fines (sand and silt-sized particles) that are already in the stream, usually below bank-full discharge elevation. Subsequent re-watering (resumption of flows) of the channel can result in a plume of turbidity and sedimentation.

This technique washes the fines back into the channel bed. Bedload materials, including gravel cobbles, boulders and those fines, are naturally mobilized during higher storm flows. This technique is intended to delay the discharge until the fines would naturally be mobilized.

This technique should be used when construction work is required in channels. It is especially useful in intermittent or ephemeral streams in which work is performed “in the dry,” and which subsequently become re-watered.

Prior to using this technique consider the following:

- The stream must have sufficient gravel and cobble substrate composition.
- The use of this technique requires consideration of time of year and timing of expected stream flows.

- The optimum time for the use of this technique is in the fall, prior to winter flows.
- Consultation with, and approval from the Department of Fish and Wildlife and the Regional Water Quality Control Board may be required.

The following items should be considered when preparing project plans and specifications when this technique is used:

- Apply sufficient water to wash fines, but not cause further erosion or runoff.
- Apply water slowly and evenly to prevent runoff and erosion.
- Consult with Department of Fish and Wildlife and the Regional Water Quality Control Board for specific water quality requirements of applied water (e.g., chlorine).

Isolation Techniques

Isolation techniques are methods that isolate near shore work from a waterbody. Techniques include sheet pile enclosures, inflatable cofferdams like Aqua Dam, berms or gravel bag berms (see SC-6, “Gravel Bag Berm”) with impermeable membrane or plastic sheeting, gravel bags, cofferdams, and K-rail.

Filter Fabric Isolation Technique

A filter fabric isolation structure is a temporary structure built into a waterway to enclose a construction area and reduce sediment pollution from construction work in or adjacent to water. This structure is composed of filter fabric, gravel-filled bags, and steel t-posts.

Filter fabric may be used for construction activities such as streambank stabilization, or culvert, bridge, pier or abutment installation. It may also be used in combination with other methods, such as clean water bypasses and/or pumps.

This method involves placement of gravel bags or continuous berms to “key-in” the fabric, and subsequently staking the fabric in place.

If spawning gravel (gravel between 1 and 4 inches) is used, all other components of the isolation can be removed from the stream, and the gravel can be spread out and left as salmon spawning habitat if permitted in the project’s 404 permit. Whether spawning gravel or other types of gravel are used, only clean washed gravel should be used as infill for the gravel bags or continuous berm.

This is a method that should be used in relatively calm water, and can be used in smaller streams.

Prior to using this technique consider the following:

- Do not use if the installation, maintenance and removal of the structures will disturb sensitive aquatic species of concern.
- Not appropriate for projects where dewatering is necessary.
- Not appropriate to completely dam streamflow.

The following items should be considered when preparing project plans and specifications when this technique is used:

- For the filter fabric isolation method, a non-woven or heavy-duty fabric (refer to Standard Specifications Section 96-1.02B) is recommended over standard silt fence. Using rolled geotextiles allows non-standard widths to be used.
- Anchor filter fabric with gravel-filled bags filled with clean, washed gravel. Do not use sand. If a bag should split open, the gravel can be left in the stream if permitted under the project's 404 permit, where it can provide aquatic habitat benefits.
- Another anchor alternative is a continuous berm, made with the Continuous Berm Machine. This is a gravel-filled bag that can be made in very long segments. The length of the berms is usually limited to 20 ft for ease of handling.
- Place the fabric on the bottom of the stream, and place either a bag of clean, washed gravel or a continuous berm over the bottom of the fabric, such that a bag-width of fabric lies on the stream bottom. The bag should be placed on what will be the outside of the isolation area.
- Pull the fabric up, and place a metal t-post immediately behind the fabric, on the inside of the isolation area; attach the fabric to the post with three diagonal nylon ties.
- Continue placing fabric as described above until the entire work area has been isolated, staking the fabric at least every 6 ft.
- During construction, inspect daily during the workweek.
- Schedule additional inspections during storm events.
- Immediately repair any gaps, holes or scour.
- Remove sediment buildup.
- Ensure pipe diversion is properly anchored to prevent shifting or leaking during use.
- Remove BMP upon completion of construction activity. Recycle or re-use if applicable.
- Re-vegetate areas disturbed by BMP removal if needed.

Turbidity Curtain Isolation Technique

A turbidity curtain is a fabric barrier used to isolate the near shore work area. The barriers are intended to confine the suspended sediment. The curtain is a floating barrier, and thus does not prevent water from entering the isolated area; rather, it prevents suspended sediment from getting out.

Turbidity curtains should be used where sediment discharge to a stream is unavoidable. They are used when construction activities adjoin quiescent waters, such as lakes, ponds, lagoons, bays, and slow flowing rivers. The curtains are designed to deflect and contain sediment within a limited area and provide sufficient retention time so that the soil particles will fall out of suspension.

Prior to using this technique consider the following:

- Turbidity curtains should not be used in flowing water; they are best suited for use in quiescent ponds, lakes, lagoons, bays, and very slow-moving rivers.
- Turbidity curtains should not be placed across the entire width of a channel.
- Removing sediment that has been deflected and settled out by the curtain may create a discharge problem through the re-suspension of particles and by accidental dumping by the removal equipment.
- Turbidity curtains may require a higher level of maintenance, adjustments, and relocation when deployed in comparison to structural isolation methods. However, turbidity curtains consist of

flexible materials and may be repositioned and reconfigured as the limits of construction activity change.

The following items should be considered when preparing project plans and specifications when this technique is used:

- Turbidity curtains should be oriented parallel to the direction of flow wherever possible to avoid exerting excessive pressure on the fabric.
- The curtain should extend the entire depth of the watercourse in calm-water situations.
- In wave conditions, the curtain should extend to within 1 ft of the bottom of the watercourse, such that the curtain does not stir up sediment by hitting the bottom repeatedly. If it is desirable for the curtain to reach the bottom in an active-water situation, a pervious filter fabric may be used for the bottom 1 ft.
- The top of the curtain should consist of flexible flotation buoys, and the bottom shall be held down by a load line incorporated into the curtain fabric. The fabric shall be a brightly colored impervious mesh.
- The curtain shall be held in place by anchors placed at least every 100 ft, or as recommended by the manufacturer based on site-specific conditions, such as flow rate, wind speeds, currents, tidal influence, and wave action.
- First place the anchors, then tow the fabric out in a furled condition, and connect to the anchors. The anchors should be connected to the flotation devices, and not to the bottom of the curtain. Once in place, cut the furling lines, and allow the bottom of the curtain to sink. A second set of anchors may be required in tidally-influenced waters to secure the curtain against both the flood and ebb tides.
- Sediment that has been deflected and settled out by the curtain may be removed if so directed by the on-site inspector or the RE. Consideration must be given to the probable outcome of the removal procedure. It must be asked if it will create more of a sediment problem through re-suspension of the particles or by accidental dumping of material during removal. It is recommended that the soil particles trapped by the turbidity curtain only be removed if there has been a significant change in the original contours of the affected area in the watercourse.
- Particles should always be allowed to settle for a minimum of 6 to 12 hours prior to their removal or prior to removal of the turbidity curtain.
- The curtain should be inspected daily for holes or other problems, and any repairs needed should be made promptly.
- Allow sediment to settle for 6 to 12 hours prior to removal of sediment or curtain. This means that after removing sediment, wait an additional 6 to 12 hours before removing the curtain.
- To remove, install furling lines along the curtain, detach from anchors, and tow out of the water. Water quality monitoring is typically required before removing the turbidity curtain to verify that the entrained water, sediment, and other potential contaminants, such as sulfides, would not violate a water quality standard when released.

K-rail River Isolation

This is temporary sediment control, or stream isolation method that uses K-rails to form the sediment deposition area, or to isolate the in-stream or near-bank construction area.



Barriers are placed end-to-end in a pre-designed configuration and gravel-filled bags are used at the toe of the barrier and also at their abutting ends to seal and prevent movement of sediment beneath or through the barrier walls.

The K-rail isolation can be used in streams with higher water velocities than many other isolation techniques.

Prior to using this technique consider the following:

- The K-rail method does not allow for full dewatering.

The following items should be considered when preparing project plans and specifications when this technique is used:

- To create a floor for the K-rail, move large rocks and obstructions. Place washed gravel and gravel-filled bags to create a level surface for K-rail to sit.
- Place the bottom two K-rails adjacent to each other, and parallel to the direction of flow; fill the center portion with gravel bags. Then place the third K-rail on top of the bottom two; there should be sufficient gravel bags between the bottom K-rails such that the top one is supported by the gravel. Place plastic sheeting around the K-rails, and secure at the bottom with gravel bags.
- Further support can be added by pinning and cabling the K-rails together. Also, large riprap and boulders can be used to support either side of the K-rail, especially where there is strong current.
- The barrier should be inspected at least once daily, and any damage, movement or other problems should be addressed immediately.
- Sediment should be allowed to settle for at least 6 to 12 hours prior to removal of sediment, and for 6 to 12 hours prior to removal of the barrier.

Stream Diversions

Stream diversions consist of a system of structures and measures that intercept an existing stream upstream of the project and, transports it around the work area, and discharges it downstream. The selection of which stream diversion technique to use depends upon the type of work involved, physical characteristics of the site, and the volume of water flowing through the project.

Pumped diversions are appropriate in areas where de-watering is necessary.

Dam-type diversions may serve as temporary access to the site.

Where work areas require isolation from flows.

Prior to using this technique consider the following:

- Pumped diversions have limited flow capacity.
- Pumped diversion require frequent monitoring of pumps.
- Large flows during storm events can overtop dams.
- Flow diversion and re-direction with small dams involves in-stream disturbance and mobilization of sediment.

The following items should be considered when preparing project plans and specifications when this technique is used:



- Installation guidelines will vary based on existing site conditions and type of diversion used.
- Diversions shall be sized to convey design flood flows.
- Pump capacity must be sufficient for design flow; the upper limit is approximately 10 cfs (the capacity of two 8 inch pumps).
- Adequate energy dissipation must be provided at the outlet to minimize erosion.
- Dam materials used to create dams upstream and downstream of diversion should be erosion resistant; materials such as steel plate, sheetpile, sandbags, continuous berms, inflatable water bladders, etc. would be acceptable.
- When constructing a diversion channel, begin excavation of the channel at the proposed downstream end, and work upstream. Once the watercourse to be diverted is reached, and the excavated channel is stable, breach the upstream end, and allow water to flow down the new channel. Once flow has been established in the diversion channel, install the diversion weir in the main channel; this will force all water to be diverted from the main channel.
- Inspect diversion/encroachment structures before and after significant storms, and at least once per week while in service. Inspect daily during the construction.
- Pumped diversions require frequent monitoring of pumps.
- Inspect embankments and diversion channels before and after significant storms, and at least once per week while in service for damage to the linings, accumulating debris, sediment buildup, and adequacy of the slope protection. Remove debris and repair linings and slope protection as required. Repair holes, gaps, or scour.
- Upon completion of work, the diversion or isolation structure should be removed and flow should be re-directed through the new culvert or back into the original stream channel. Recycle or re-use if applicable.

SWPPP or WPCP

Clear Water Diversion must be discussed in Section 500.4 of the SWPPP or Section 30.3 of the WPCP.

Illegal Connection and Illicit Discharge Detection and Reporting

NS-6



Standard Symbol

BMP Objectives

Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☒
Materials and Waste Management	☐

Definition and Purpose

Procedures and practices designed for construction contractors to recognize illegal connections, illicit discharges or illegally dumped or discharged materials on a construction site and report incidents to the RE.

Appropriate Applications

Illegal connection and Illicit discharge detection and reporting is applicable anytime an illegal connection or illicit discharge is discovered, or illegally dumped material is found on the construction site.

This BMP applies to all construction projects.

Limitations

Illegal connection and Illicit discharge or dumping, for the purposes of this BMP, refer to discharges and dumping caused by parties other than the contractor.

Procedures and practices presented in this BMP are general. Contractor shall use extreme caution, immediately notify the RE when illicit connections or illegal dumping or discharges are discovered, and take no further action unless directed by the RE.

If pre-existing hazardous materials or wastes are known to exist onsite, the contractor's responsibility will be detailed in separate special provisions. Onsite area should be clearly marked and described in the SWPPP or WPCP.



Illegal Connection and Illicit Discharge Detection and Reporting

NS-6

Standards and Specifications

Inspection

Inspect site before beginning the job for evidence of Illegal connections or illicit dumping or discharges.

Illegal Connection and Illicit Discharge Detection and Reporting

Solids Look for debris or trash piles. Solid waste dumping often occurs on roadways with light traffic loads or in areas not easily visible from the traveled way.

Liquids – signs of illegal liquid dumping or discharge can include:

- Visible signs of staining or unusual colors to the pavement or surrounding adjacent soils.
- Pungent odors coming from the drainage systems.
- Discoloration or oily substances in the water or stains and residues detained within ditches, channels or drain boxes.
- Abnormal water flow during the dry weather season.

Urban Areas - Evidence of illegal connections or illicit discharges is typically detected at storm drain outfall locations or at manholes. Signs of an illegal connection or illicit discharge can include:

- Abnormal water flow during the dry weather season.
- Unusual flows in subdrain systems used for dewatering.
- Pungent odors coming from the drainage systems.
- Discoloration or oily substances in the water or stains and residues detained within ditches, channels or drain boxes.
- Excessive sediment deposits, particularly adjacent to or near active off-site construction projects.

Rural Areas - Illegal connections or illicit discharges involving irrigation drainage ditches are detected by visual inspections. Signs of an illicit discharge can include:

- Abnormal water flow during the dry weather season.
- Non-standard drainage junction structures.
- Broken concrete or other disturbances at or near junction structures.

Reporting

Notify the RE of any illegal connections and illicit dumping or discharge incidents at the time of discovery. Do not take further action unless ordered.

The RE will notify the District Construction Stormwater Coordinator, who should coordinate with the NPDES Coordinator for reporting.



Illegal Connection and Illicit Discharge Detection and Reporting

NS-6

Inspection, Cleanup, and Removal

Notify the RE of any illegal connections and illegal dumping or illicit discharge incidents at the time of discovery. Do not take further action unless ordered.

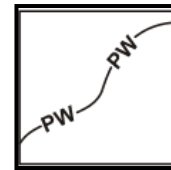
The contractor is not responsible for investigation and clean-up of illegal connections or dumping or illicit discharges not generated by the contractor. Caltrans may direct the contractor to clean up non-hazardous dumped or discharged material on the construction site. Assume that unlabeled or unidentifiable material is hazardous.

Inspect the entire project site at least weekly to check for illegal connections or illicit discharges.

SWPPP or WPCP

Illegal Connection and Illicit Discharge Detection and Reporting must be discussed in Section 500.4.1 of the SWPPP or Section 30.3 of the WPCP.





Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☒
Materials and Waste Management	☐

Definition and Purpose

Potable Water/Irrigation management consists of practices and procedures to manage the discharge of potential pollutants generated during discharges from irrigation water lines, landscape irrigation, lawn or garden watering, planned and unplanned discharges from potable water sources, water line flushing, and hydrant flushing.

Appropriate Applications

Implement this BMP whenever the above activities or discharges occur at or enter a construction site.

Limitations

None identified.

Standards and Specifications

Inspect irrigated areas within the construction limits for excess watering. Adjust watering times and schedules to ensure that the appropriate amount of water is being used and to minimize runoff. Consider factors such as soil structure, grade, relative compaction, time of year, and type of plant material in determining the proper amounts of water for a specific area.

Take precautions to prevent irrigation water from eroding soil, wetting vehicles and pavement, or otherwise causing sediment, hydrocarbons, and other non-visible pollutants that accumulate on those surfaces to discharge into a storm drain system or receiving waterbody.

When possible, discharges from water line flushing or temporary Active Treatment Systems (see Appendix C “Temporary Active Treatment System”) should be reused for landscaping purposes.

Resident Engineer (RE) approval is required prior to commencing any washing activities that could discharge to the storm drain or receiving waterbody.

Where possible, direct water from off-site sources around or through a construction site in a way that minimizes contact with the construction site.

Perform pressure tests on the irrigation system supply lines to test for leaks, which could result in erosion or runoff if breached.

Shut off the water source to broken lines, sprinklers, or valves as soon as possible to prevent excess water flow.

Protect downstream storm water drainage systems and receiving waters from water pumped or bailed from trenches excavated to repair water lines.

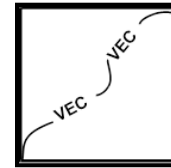
Maintenance and Inspection

Repair broken water lines as soon as possible or as directed by the RE.

Inspect irrigated areas regularly for signs of erosion and/or discharge.

SWPPP or WPCP

Potable Water/Irrigation must be discussed in Section 500.4 of the SWPPP and/or Section 30.3 of the WPCP.



Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☒
Materials and Waste Management	☐

Definition and Purpose

Vehicle and equipment cleaning procedures and practices are used to minimize or eliminate the discharge of pollutants from vehicle and equipment cleaning operations to storm drain systems or to watercourses.

Appropriate Applications

These procedures are applied on all construction sites where vehicle and equipment cleaning is performed.

Limitations

This BMP may be limited or disallowed under regulatory agency permits, particularly near Environmentally Sensitive Areas (ESAs).

Generates non-stormwater that requires management, and, in some cases, the disposal of hazardous waste.

Standards and Specifications

General Requirements

Limit vehicle and equipment cleaning or washing at the job site except for the safety and protection of the equipment and as needed to comply with regulatory agency permits and approvals.

Cleaning of vehicles and equipment with soap, solvents or steam shall not occur on the job site unless the RE has been notified in advance and the resulting wastes are fully contained in accordance with Standard Specifications Section 14-11 or 13-4.03D (5), whichever is applicable. Do not use diesel to clean vehicles and minimize the use of solvents.

Vehicle and equipment wash water shall be contained for percolation or evaporative drying away from storm drain inlets or receiving waters and should not be discharged within the highway right-of-way. Apply other appropriate BMPs as applicable.

All vehicles/equipment that regularly enter and leave the construction site must be cleaned off-site.

Resulting wastes and by-products shall not be discharged or buried within the highway right-of-way, and must be captured and recycled or disposed according to the requirements of WM-10, "Liquid Waste Management" or WM-6, "Hazardous Waste Management," depending on the waste characteristics.

Implementation

When vehicle/equipment washing/cleaning must occur onsite, and the operation cannot be located within a structure or building equipped with appropriate disposal facilities, the outside cleaning area shall have the following characteristics, and shall be arranged with the WPC Manager, QSD, or QSP as well as the Construction Storm Water Coordinator:

- Located away from storm drain inlets, drainage facilities, or watercourses.
- Paved with concrete or asphalt and bermed to contain wash waters and to prevent run-on and runoff.
- Configured with a sump to allow collection and disposal of wash water.
- Wash waters shall not be discharged to storm drains or watercourses.
- Used only when necessary.

When cleaning vehicles/equipment with water:

- Use as little water as possible. High pressure sprayers may use less water than a hose, and shall be considered.
- Use positive shutoff valve to minimize water usage.
- Facility wash racks shall discharge to a sanitary sewer, recycle system or other approved discharge system and shall not discharge to the storm drainage system or watercourses.

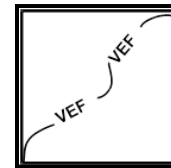
Maintenance and Inspection

The control measure shall be inspected at least weekly, prior to a forecasted rain event, daily during extended rain events and post-storm events.

Inspect wash area and sump regularly. Remove liquids and sediment as needed or as directed by the RE.

SWPPP or WPCP

Vehicle Equipment Cleaning must be discussed in Section 500.4.2 of the SWPPP or Section 30.3 of the WPCP.



Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☒
Materials and Waste Management	☐

Definition and Purpose

Vehicle and equipment fueling procedures and practices are designed to minimize or eliminate the discharge of fuel spills and leaks into storm drain systems or to receiving waters.

Appropriate Applications

These procedures are applied on all construction sites where vehicle and equipment fueling takes place.

Limitations

This BMP may be limited or disallowed under regulatory agency permits, particularly near Environmentally Sensitive Areas (ESAs).

Onsite vehicle and equipment fueling should only be used where it's impractical to send vehicles and equipment off-site for fueling.

Standards and Specifications

When fueling must occur onsite, the contractor shall select and designate an area or areas to be used, subject to approval of the RE.

Dedicated fueling areas shall be protected from stormwater run-on and runoff, and shall be located at least 50 feet from downstream drainage facilities and watercourses. Fueling must be performed on level-grade areas.

Protect fueling areas with berms or dikes to prevent run-on, runoff, and to contain spills.

Vehicle and Equipment Fueling

NS-9

For long-term projects, consider constructing roofs or using portable tents over maintenance and fueling areas.

Absorbent spill clean-up materials and spill kits shall be available in fueling areas and on fueling trucks and used on small spills instead of hosing down or burying techniques. Affected absorbent material and spill kits should be removed promptly and disposed of properly after use.

Drip pans or absorbent pads shall be readily available during vehicle and equipment fueling.

Vehicle and equipment fueling areas shall not be left unattended during fueling activities.

Nozzles used in vehicle and equipment fueling shall be equipped with an automatic shut-off to control drips.

Use vapor recovery nozzles to help control drips as well as air pollution where required by the Air Quality Management Districts.

Ensure the nozzle is secured upright when not in use.

Fuel tanks shall not be "topped-off."

Federal, state, and local requirements shall be observed for any stationary above ground storage tanks. Refer to WM-1, "Material Delivery and Storage" for specifics as to what needs to be included for BMP protection and documented in the SWPPP or WPCP.

Portable fuel canisters should be kept in a flammable cabinet when not in use.

Maintenance and Inspection

Vehicles and equipment shall be inspected on each day of use for leaks. Leaks shall be repaired immediately or problem vehicles or equipment shall be removed from the project site.

Fueling areas and storage tanks shall be inspected at least weekly, prior to a forecasted rain event, daily during extended rain events and post-storm events.

Immediately cleanup spills and properly dispose of contaminated soil and cleanup materials.

SWPPP or WPCP

Vehicle and Equipment Fueling must be discussed in Section 500.4.2 of the SWPPP or Section 30.3 of the WPCP.





Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☒
Materials and Waste Management	☐

Definition and Purpose

Procedures and practices to minimize or eliminate the discharge of pollutants to the storm drain systems or to receiving waters from vehicle and equipment maintenance activities.

Appropriate Applications

These procedures apply on all construction projects where an onsite uncovered yard area is necessary for storage and maintenance of heavy equipment and vehicles.

Limitations

This BMP may be limited or disallowed under regulatory agency permits, particularly near Environmentally Sensitive Areas (ESAs).

Onsite vehicle and equipment maintenance should only be used where it's impractical to send vehicles and equipment off-site for fueling.

Standards and Specifications

When maintenance must occur onsite, the contractor shall select and designate an area to be used, subject to approval of the RE and implement appropriate controls for the activities to be performed.

Dedicated maintenance areas shall be on level ground and protected from storm water run-on and runoff, and shall be located at least 50 ft from downstream drainage facilities and receiving waters.

Protect maintenance areas with berms or dikes to prevent run-on, runoff, and to contain spills.

For long-term projects, consider constructing roofs or using portable tents over maintenance areas.

Absorbent spill clean-up materials and spill kits shall be available in maintenance areas and used on small spills instead of hosing down or burying techniques. Affected absorbent material and spill kits should be removed promptly and disposed of properly after use.

Drip pans or absorbent pads shall be placed under vehicles and equipment when performing maintenance work that involves fluids. Vehicles and equipment maintenance areas shall not be left unattended during maintenance activities.

Drip pans or plastic sheeting shall be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is planned to be idle for more than one hour.

Properly dispose or recycle used batteries and tires as well as any other vehicle or equipment parts.

Substances used to coat asphalt transport trucks and asphalt-spreading equipment shall be non-toxic.

Properly dispose of used oils, fluids, lubricants, and spill cleanup materials.

Do not dump fuels and lubricants onto the ground.

Do not place used oil in a dumpster or pour into a storm drain or watercourse.

Do not bury used tires.

Repair fluid and oil leaks immediately.

Provide spill containment dikes or secondary containment around stored oil and chemical drums. Refer to WM-1, "Material Delivery and Storage" for details.

Maintenance and Inspection

Vehicles and equipment shall be inspected on each day of use for leaks. Leaks shall be repaired immediately or removed from the project site.

Maintenance areas and storage tanks shall be inspected regularly.

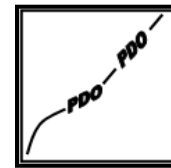
Maintain waste fluid containers in leak proof condition.

Inspect equipment for damaged hoses and leaky gaskets routinely. Repair or replace as needed.

Inspection and Maintenance of these areas must be properly documented and the WPC Manager must ensure no potential for discharges occur from these areas as part of the non-visible monitoring requirements.

SWPPP or WPCP

Vehicle and Equipment Maintenance must be discussed in Section 500.4 of the SWPPP or Section 30.3 of the WPCP.



Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☒
Materials and Waste Management	☐

Definition and Purpose

The construction and retrofit of bridges and retaining walls often include driving piles for foundation support and shoring operations. Driven piles are typically constructed of concrete, steel, or timber. Driven sheet piles are used for shoring and cofferdam construction. Proper control and use of equipment, materials, and waste products from pile driving operations will reduce the discharge of potential pollutants to the storm drain system or receiving waters.

Appropriate Applications

These procedures apply to construction sites near or adjacent to surface waters or groundwater where permanent and temporary pile driving operations (impact and vibratory) take place, including operations using pile shells for construction of cast-in-steel-shell and cast-in-drilled-hole piles.

Limitations

None identified.

Standards and Specifications

Have spill kits and cleanup materials available at all locations of pile driving. Refer to WM-4 “Spill Prevention and Control.”

Place drip pans, absorbent pads, or plastic sheeting with absorbent material under vehicles and equipment performing pile driving activities. Refer to NS-9 “Vehicle and Equipment Fueling” and NS-10 “Vehicle and Equipment Maintenance.”

Protect pile driving equipment, including hammers and other hydraulic attachments, by parking them on plywood and covering it with plastic sheeting when precipitation is forecasted.

When not in use, store pile driving equipment on level ground away from concentrated flows of storm water, drainage courses, and inlets.

Use less hazardous vegetable oil instead of hydraulic fluid, when practicable.

Keep equipment that is in use in streambeds; or on docks, barges, or other structures over water bodies, leak free. The storage or use of equipment in streambeds or other bodies of water shall comply with all applicable regulatory permits. Refer to NS-13, “Material and Equipment Use Over Water.”

Implement other BMPs as applicable, such as NS-2 “Dewatering Operations,” WM-5 “Solid Waste Management,” WM-6 “Hazardous Waste Management,” and WM-10 “Liquid Waste Management.”

Maintenance and Inspection

Inspect pile driving areas and equipment for leaks and spills daily when they are in operation or within or next to water.

Inspect pile driving areas and equipment for leaks and spills at least weekly, prior to a forecasted rain event, daily during extended rain events and post-storm events.

Inspect equipment routinely and repair equipment as needed (e.g., worn or damaged hoses, fittings, gaskets).

Inspection and Maintenance of these areas must be properly documented and the WPC Manager must ensure no potential for discharges occur from these areas as part of the non-visible monitoring requirements.

SWPPP or WPCP

Pile Driving Operations must be discussed in Section 500.4 and 600.2 of the SWPPP or Section 30 of the WPCP.



Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☒
Materials and Waste Management	☒

Definition and Purpose

Concrete curing is used in the construction of structures such as bridges, retaining walls, and pump houses. Concrete curing includes the use of both chemical and water methods. Proper procedures to minimize any potential for runoff during concrete curing must take place.

Appropriate Applications

All concrete elements of a structure (e.g., footings, columns, abutments, stems, soffit, deck) are subject to curing requirements.

Limitations

None identified.

Standards and Specifications

Chemical Curing

Avoid over-spray of curing compounds.

Minimize the drift of chemical cure as much as possible by applying the curing compound close to the concrete surface. Apply an amount of compound that covers the surface, but does not allow any runoff of the compound.

Use proper storage and handling techniques for concrete curing compounds. Refer to WM-1, “Material Delivery and Storage.”

Protect drain inlets prior to the application of curing compounds. Refer to SC-10, “Temporary Drainage Inlet Protection.”

Implement WM-4, “Spill Prevention and Control.

Water Curing for Bridge Decks, Retaining Walls, and Other Structures

Direct cure water away from inlets and receiving waters to collection areas for removal as approved by the RE and in accordance with all applicable permits.

Collect cure water and transport or dispose of water in accordance with all applicable permits

Utilize wet blankets or a similar method that maintains moisture while minimizing the use and possible discharge of water.

Maintenance and Inspection

Ensure that employees and subcontractors implement appropriate measures for storage, handling, and use of curing compounds.

Inspect any temporary diversion devices, lined channels, or swales for washouts, erosion, runoff or debris. Replace lining and remove debris as necessary.

Inspect cure containers and spraying equipment for leaks. Also, inspect concrete curing areas daily when there are ongoing operations.

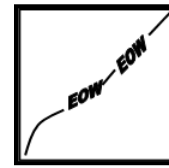
The WPC Manager or QSP must ensure no concrete curing activities occur when rain is forecasted that could lead to a discharge.

SWPPP or WPCP

Concrete Curing must be discussed in Section 500.4 of the SWPPP or Section 30.3 of the WPCP.

Material and Equipment Use Over Water

NS-13



Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☒
Materials and Waste Management	☒

Definition and Purpose

Procedures for the proper use, storage, and disposal of materials and equipment on barges, boats, temporary construction pads, or similar locations that minimize or eliminate the discharge of potential pollutants into storm drain inlets or receiving waters.

Appropriate Applications

These procedures shall be implemented for construction materials and wastes (solid and liquid) and any other materials that may be detrimental if released. Applies where materials and equipment are used on barges, boats, docks, and other platforms over or adjacent to a watercourse.

Limitations

Specific requirements may be included in the contract documents and permit documents associated with regulatory agencies such as the Regional Water Quality Control Board (RWQCB), U.S. Army Corps of Engineers, and California Department of Fish and Wildlife.

Standards and Specifications

Measures to prevent the discharge of potential pollutants into storm drain inlets or receiving waters while operating equipment or using materials over water are considered BMPs by the regulatory agencies and should be documented in the SWPPP.



Material and Equipment Use Over Water

NS-13

Implement this BMP in accordance with all necessary permits required for construction within or near receiving waters, such as RWQCB, U.S. Army Corps of Engineers, Department of Fish and Wildlife and other local permitting agencies.

Place drip pans and absorbent materials under equipment and vehicles and ensure that an adequate supply of spill cleanup materials is onsite in accordance with a spill response plan, if applicable. Ensure that staff are trained regarding the deployment of the spill response plan.

Drip pans shall be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is expected to be idle for more than one hour.

Install watertight curbs or toe boards to contain spills and prevent materials, tools, and debris from falling off the barge, platform, dock, etc.

Secure all materials to prevent discharges to receiving waters via wind.

Discharges to receiving waters shall be reported to the RE and the WPC Manager immediately upon discovery.

Maintain vehicles and equipment in accordance with NS-10, “Vehicle and Equipment Maintenance.” If a leaking line cannot be repaired, remove equipment from over the water and repair immediately.

Collect and contain demolished material in accordance with NS-15, “Structure Demolition/Removal Over or Adjacent to Water.”

Refer to WM-1, “Material Delivery and Storage” and WM-4, “Spill Prevention and Control.”

Ensure the timely and proper removal of accumulated wastes over water. Refer to WM-5, “Solid Waste Management” and WM-6, “Hazardous Waste Management.”

Maintenance and Inspection

Inspect vehicles and equipment for leaks and spills daily when they are in operation, make necessary repairs.

Ensure that employees and subcontractors implement appropriate measures for storage and use of materials and equipment.

Inspect and maintain all associated BMPs and perimeter controls to ensure continuous protection of the watercourse.

Inspect materials and equipment for leaks and spills at least weekly, prior to a forecasted rain event, daily during extended rain events and post-storm events.

Inspect equipment routinely and repair equipment as needed (e.g., worn or damaged hoses, fittings, gaskets).



Material and Equipment Use Over Water

NS-13

Inspection and Maintenance of these areas must be properly documented and ensure no potential for discharges occur from these areas as part of the non-visible monitoring requirements.

SWPPP or WPCP

Material and Equipment Use Over Water must be discussed in Section 500.4.1 of the SWPPP or Section 30.3.1 of the WPCP.





Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☒
Materials and Waste Management	☒

Definition and Purpose

Concrete finishing methods are used for bridge deck rehabilitation, paint removal, curing compound removal, and final surface finish appearances. Methods include sand blasting, shot blasting, grinding, or high-pressure water blasting. Proper procedures minimize the impact that concrete finishing methods may have on runoff.

Appropriate Applications

These procedures apply to all construction locations where concrete finishing operations are performed.

Limitations

Specific permit requirements may be included in the contract documents for certain concrete finishing operations.

Standards and Specifications

General Requirements

Follow containment requirements stated in the project special provisions.

Collect and properly dispose of water and solid waste from high-pressure water blasting operations.

Collect and properly dispose of water from water blasting operations, sand and solid waste from sandblasting operations.

Protect drainage inlets within 50 feet of the sandblasting prior to beginning sandblasting operations. Refer to SC-10, "Temporary Drainage Inlet Protection."

Implement SC-7, “Street Sweeping” within the sand blasting and surrounding area.

Minimize the drift of dust and blast material as much as possible by keeping the blasting nozzle close to the surface.

Discharges to waterways shall be reported to the RE by the WPC Manager immediately upon discovery.

Other Considerations

Direct water from blasting operations away from inlets and receiving waters to collection areas for removal (e.g., dewatering) as approved in advance by the RE and in accordance with applicable permits.

When blast residue contains a potentially hazardous waste, refer to WM-6, “Hazardous Waste Management.”

Implement WM-8, “Concrete Waste Management” in combination with this BMP.

Maintenance and Inspection

At a minimum, inspect containment structures, if any, for damage or voids prior to use each day and prior to a likely forecasted rain event.

At the end of each work shift, remove and contain the liquid and solid wastes from containment structures, if any, and from the general work area.

Inspect concrete finishing areas at least weekly, prior to a forecasted rain event, daily during extended rain events and post-storm events.

Inspection and Maintenance of these areas must be properly documented and ensure no potential for discharges occur from these areas as part of the non-visible monitoring requirements.

SWPPP or WPCP

Concrete Finishing must be discussed in Section 500.4 of the SWPPP or Section 30.3.1 of the WPCP.

Structure Demolition/Removal Over or Adjacent to Water

NS-15



Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☒
Materials and Waste Management	☐

Definition and Purpose

Procedures to protect water bodies from debris and wastes associated with structure demolition or removal over or adjacent to receiving waters.

Appropriate Applications

Full bridge demolition and removal projects.

Partial bridge removal (e.g., barrier rail, edge of deck) associated with bridge widening projects.

Projects that involve concrete channel removal.

Any other project with structure removal that could potentially affect water quality.

Limitations

Specific requirements may be included in the contract documents and permit documents associated with regulatory agencies such as the Regional Water Quality Control Board, U.S. Army Corps of Engineers, and California Department of Fish and Wildlife.



Structure Demolition/Removal Over or Adjacent to Water

NS-15

Standards and Specifications

General Requirements

A plan summarizing material containment, collection, and handling may be required to be submitted and fully implemented with the SWPPP.

Do not allow demolished material to enter storm drain systems and receiving waters. Use covers and platforms authorized by the RE to collect debris.

Collect and contain all demolished material within the containment system including process water and visible dust produced during demolition and cleaning operations daily. Handle debris according to Standard Specifications Section 13-4.03D.

Implement in combination with NS-13, “Material and Equipment Use Over Water” and WM-04 “Spill Prevention and Control,” for handling of materials and equipment.

Routinely sweep and vacuum work area to remove excess dust and debris in accordance with SC-07, “Street Sweeping.”

Use inlet protection in accordance with SC-10, “Temporary Drainage Inlet Protection,” to protect storm drain inlets.

Refer to NS-5, “Clear Water Diversion” to direct water away from work areas.

Stockpile accumulated debris and waste generated during demolition away from drainage inlets and receiving waters and in accordance with WM-3, “Stockpile Management.”

For structures containing hazardous materials (e.g., lead paint or asbestos) refer to WM-6, “Hazardous Waste Management.” For demolition work involving soil excavation around lead-painted structures, refer to WM 7, “Contaminated Soil Management.”

Discharges to drainage inlets and receiving waters shall be reported to the RE and WPC Manager immediately upon discovery. A written discharge notification must follow.

Keep adequate spill kit material onsite in accordance with a spill response plan, if applicable. Ensure that staff are trained regarding the deployment of the spill response plan.

Ensure safe passage of wildlife, refer to Standard Specifications 83-3 Concrete Barriers.

Other Considerations

Use attachments on construction equipment, such as backhoes and debris baskets, or barges to catch debris from demolition operations. Use plastic bibs to prevent hydraulic fuel leaks.

Install perimeter controls and secondary containment to prevent leaks and spills from entering receiving waters. Perimeter controls and secondary containment may include sealed plywood and/or plastic sheeting,



Structure Demolition/Removal Over or Adjacent to Water

NS-15

plastic liners and/or tarps, netting, silt fences, drip pans, containment booms and berms, and absorbent material.

Maintenance and Inspection

Contractor must inspect demolition areas and containment systems over or adjacent to receiving waters daily when operations are ongoing.

Any debris-catching devices and containment systems shall be emptied daily. Collected debris shall be removed and stored away from the drainage inlets and receiving waters and protected from run-on and runoff.

Inspect demolition and containment systems over or adjacent to for leaks and spills at least weekly, prior to a forecasted rain event, daily during extended rain events and post-storm events.

Inspection and Maintenance of these areas must be properly documented and ensure no potential for discharges occur from these areas as part of the non-visible monitoring requirements.

SWPPP or WPCP

Structure Demolition/Removal Over or Adjacent to Water must be discussed in Section 500.4.1 of the SWPPP or Section 30 of the WPCP.



Section 8

Waste Management and Materials Pollution Control BMPs

8.1 Waste Management and Materials Pollution Control

Waste management and materials pollution control BMPs, like non-stormwater management BMPs, are source control BMPs that prevent pollution by limiting or reducing potential pollutants at their source before they come in contact with stormwater. These BMPs also involve day-to-day operations of the construction site and are under the control of the Contractor, and are additional “good housekeeping practices,” which involve keeping a clean, orderly construction site.

Waste Management BMPs

Waste management consists of implementing procedural and structural BMPs for handling, storing, and disposing of wastes generated by a construction project to prevent the release of waste materials into stormwater discharges.

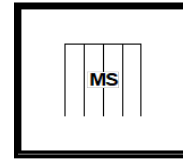
Materials Pollution Control BMPs

Materials pollution control (also called materials handling) consists of implementing procedural and structural BMPs for handling, storing, and using construction materials to prevent the release of those materials into stormwater discharges. The objective is to reduce the opportunity for rainfall to come in contact with these materials. These controls must be implemented for all applicable activities, material usage and site conditions.

Table 8-1 lists the waste management and materials pollution control BMPs.

Table 8-1. Waste Management and Materials Pollution Control BMPs	
ID	BMP Name
WM-1	Material Delivery and Storage
WM-2	Material Use
WM-3	Stockpile Management
WM-4	Spill Prevention and Control
WM-5	Solid Waste Management
WM-6	Hazardous Waste Management
WM-7	Contaminated Soil Management
WM-8	Concrete Waste Management
WM-9	Sanitary and Septic Waste Management
WM-10	Liquid Waste Management

The remainder of this section shows the working details for each of the waste management and materials pollution control BMPs.



Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☒

Definition and Purpose

Procedures and practices for the proper handling and storage of materials in a manner that minimizes or eliminates the discharge of these materials to the storm drain system or to receiving waters.

Appropriate Applications

These procedures are implemented at all construction sites with delivery and storage of the following:

- Hazardous chemicals such as:
 - Acids
 - Lime
 - Glues
 - Adhesives
 - Paints
 - Solvents
 - Curing compounds
- Soil stabilizers and binders
- Fertilizers
- Detergents
- Plaster
- Petroleum products such as fuel, oil, and grease
- Asphalt and concrete components
- Pesticides and herbicides
- Other materials that may be detrimental if released to the environment

Limitations

Space limitation may preclude indoor storage.

Storage sheds must meet building & fire code requirements and be leak free.

Standards and Specifications

General Requirements

Train employees and subcontractors on the proper material delivery and storage practices.

Temporary storage area shall be located away from vehicular traffic.

Safety Data Sheets (SDS) shall be supplied to the RE for all materials stored. Can be done at any time but at least 5 days prior to material being used or stored onsite.

Must comply with Caltrans Standard Specification 13-4, "Job Site Management", and 14-11, "Hazardous Waste and Contamination."

Material Storage Areas and Practices

Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 shall be stored in approved containers and drums and shall be placed in temporary containment facilities for proper storage.

Each temporary containment facility shall have a permanent cover and side wind protection or be covered during non-working days and whenever a storm event is forecasted.

A temporary containment facility shall provide for a spill containment volume able to contain precipitation from a 24-hour, 25-year storm event, plus the greater of ten percent of the aggregate volume of all containers or 100 percent of the capacity of the largest container within its boundary, whichever is greater.

A temporary containment facility shall be impervious to the materials stored therein for a minimum contact time of 72 hours.

A temporary containment facility shall be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills shall be collected and placed into drums. These liquids shall be handled as a hazardous waste unless testing determines them to be non-hazardous. All collected liquids or non-hazardous liquids shall be sent to an approved disposal site.

Sufficient separation shall be provided between stored containers to allow for spill cleanup and emergency response access.

Incompatible materials, such as chlorine and ammonia, shall not be stored in the same temporary containment facility.

Materials shall be stored in their original containers and the original product labels shall be maintained in place in a legible condition. Damaged or otherwise illegible labels shall be replaced immediately.

Material Delivery and Storage

WM-1

Bagged and boxed materials shall be stored on pallets and shall not be allowed to accumulate on the ground. To provide protection from wind and rain, bagged and boxed materials shall be covered during non-working days and prior to rain events.

Stockpiles shall be protected in accordance with WM-3, “Stockpile Management.”

Have proper storage instructions posted at all times in an open and conspicuous location and include it as an informal training component of the tailgates and ongoing WPC training.

Do not store hazardous chemicals, drums, or bagged materials directly on the ground. Place these items on a pallet, under cover in secondary containment.

Keep ample supply of appropriate spill clean up material near storage areas.

Also, see WM-6, “Hazardous Waste Management,” for storing of hazardous materials.

Material Delivery Practices

Keep an accurate, up-to-date inventory of material delivered and stored on-site.

Employees trained in emergency spill clean-up procedures shall be present when dangerous materials or liquid chemicals are unloaded.

Spill Clean-up

Contain and clean up any spill immediately.

If significant residual materials remain on the ground after construction is complete, properly remove and dispose any hazardous materials or contaminated soil.

See WM-4, “Spill Prevention and Control,” for spills of chemicals and/or hazardous materials.



Maintenance and Inspection

Storage areas shall be kept clean, well-organized, and equipped with ample clean-up supplies as appropriate for the materials being stored.

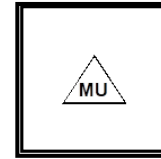
Perimeter controls, containment structures, covers, and liners shall be repaired or replaced as needed to maintain proper function.

Inspect storage areas before, during and after rainfall events, and at least weekly during other times. Collect and place into drums any spills or accumulated rainwater and dispose of properly.

Material Delivery and Storage areas must be shown on the WPCDs and reflect current site conditions.

SWPPP or WPCP

Material delivery and storage must be discussed in Section 500.4.2 of the SWPPP or Section 30.3.2 of the WPCP.



Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☒

Definition and Purpose

These are procedures and practices for use of construction materials in a manner that minimizes or eliminates the discharge of these materials to the storm drain system or to receiving waters.

Appropriate Applications

This BMP applies to all construction projects. These procedures apply when the following materials are used or prepared on site:

- Hazardous chemicals such as:
 - Acids
 - Lime
 - Glues
 - Adhesives
 - Paints
 - Solvents
 - Curing compounds
- Soil stabilizers and binders
- Fertilizers
- Detergents
- Plaster
- Petroleum products such as fuel, oil, and grease
- Asphalt and concrete components
- Pesticides and herbicides
- Other materials that may be detrimental if released to the environment

Limitations

Safer alternative building and construction products may not be available or suitable in every instance.

Standards and Specifications

Safety Data Sheets (SDS) shall be supplied to the RE for all materials.

Latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths, when thoroughly dry and are no longer hazardous, may be disposed of with other construction debris.

Do not remove the original product label, it contains important safety and disposal information. Use the entire product before disposing of the container.

Mix paint indoors, or in a containment area. Never clean paintbrushes or rinse paint containers into a street, gutter, storm drain or near a water body. Dispose of any paint thinners, residue and sludge(s), that cannot be recycled, as hazardous waste.

For water-based paint, clean brushes to the extent practical, and rinse to a drain leading to a sanitary sewer where permitted, or into a concrete washout pit. For oil-based paints, clean brushes to the extent practical and filter and reuse thinners and solvents.

Use recycled and less hazardous products when practical. Recycle residual paints, solvents, non-treated lumber, and other materials.

Use materials only where and when needed to complete the construction activity. Use safer alternative materials as much as possible.

Do not over-apply fertilizers and pesticides. Prepare only the amount needed. Strictly follow the recommended usage instructions.

Application of herbicides and pesticides shall be performed by a licensed applicator. Document the location, chemicals applied, applicants name and qualifications.

Contractors are required to complete the “Report of Chemical Spray Forms” when spraying herbicides and pesticides.

Keep an ample supply of spill clean-up material near use areas. Train employees in spill clean-up procedures.

Avoid exposing applied materials to rainfall and runoff unless sufficient time has been allowed for them to dry.

Maintenance and Inspection

Inspect storage areas before, during and after rainfall events, and at least weekly during other times. Collect and place into drums any spills or accumulated rainwater and dispose of properly.

Spot check employees and subcontractors throughout the job, include appropriate practices as part of the informal tailgate training.

SWPPP or WPCP

Material Use must be discussed in Section 500.4 of the SWPPP or Section 30.3 of the WPCP.



Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☒

Definition and Purpose

Stockpile management procedures and practices are designed to reduce or eliminate air and storm water pollution from stockpiles of soil, and paving materials such as portland cement concrete (PCC) rubble, asphalt concrete (AC), asphalt concrete rubble, aggregate base, aggregate subbase or pre-mixed aggregate, asphalt binder (so called “cold mix” asphalt) and pressure treated wood.

Appropriate Applications

Implemented in all projects that stockpile soil and other materials.

Limitations

Use of plastic cover might be restricted depending on the location of the site and regulatory permits.

Standards and Specifications

Stockpiles must comply with Standard Specification 13-4.03C (3) Stockpile Management.

Protection of stockpiles is a year-round requirement.

Locate stockpiles a minimum of 50 ft. away from concentrated flows of storm water, drainage courses, and inlets.

Utilize run-on and run-off BMPs to ensure stockpile materials are protected and do not have the potential to discharge material.

Implement wind erosion control practices as appropriate on all stockpiled material. For specific information see WE-1, “Wind Erosion Control.”

Stockpiles of contaminated soil shall be managed in accordance with WM-7, “Contaminated Soil Management.”

Bagged materials should be placed on pallets and under cover.

Protection of Inactive Stockpiles

Inactive stockpiles of the identified materials shall be protected further as follows:

- Soil stockpiles:
 - soil stockpiles shall be covered or protected with soil stabilization measures and a temporary perimeter sediment barrier at all times. If no longer needed, they should be removed and disposed of properly.
- Stockpiles of portland cement concrete rubble, asphalt concrete, asphalt concrete rubble, aggregate base, or aggregate subbase:
 - the stockpiles shall be covered or protected with a temporary perimeter sediment barrier at all times. If no longer needed, they should be removed and disposed of properly.
- Stockpiles of “cold mix”:
 - Cold mix stockpiles shall be placed on and covered with plastic or comparable material at all times and surround by a berm.
- Stockpiles/Storage of pressure treated wood with copper, chromium, and arsenic or ammonical, copper, zinc, and arsenate:
 - Treated wood shall be covered with plastic or comparable material and placed on pallets.

Protection of Active Stockpiles

Active stockpiles shall be protected further as follows:

- All stockpiles shall be covered, stabilized, or protected with a temporary linear sediment barrier prior to the onset of precipitation.
- Stockpiles of “cold mix” shall be placed on and covered with plastic or comparable material prior to the onset of precipitation.
- All Stockpiles should be removed from the site and disposed of properly.

Maintenance and Inspection

Inspect Stockpile Management areas before, during and after rainfall events, and at least weekly during other times.

Repair and/or replace perimeter controls and covers to keep Stockpile Management functioning properly.

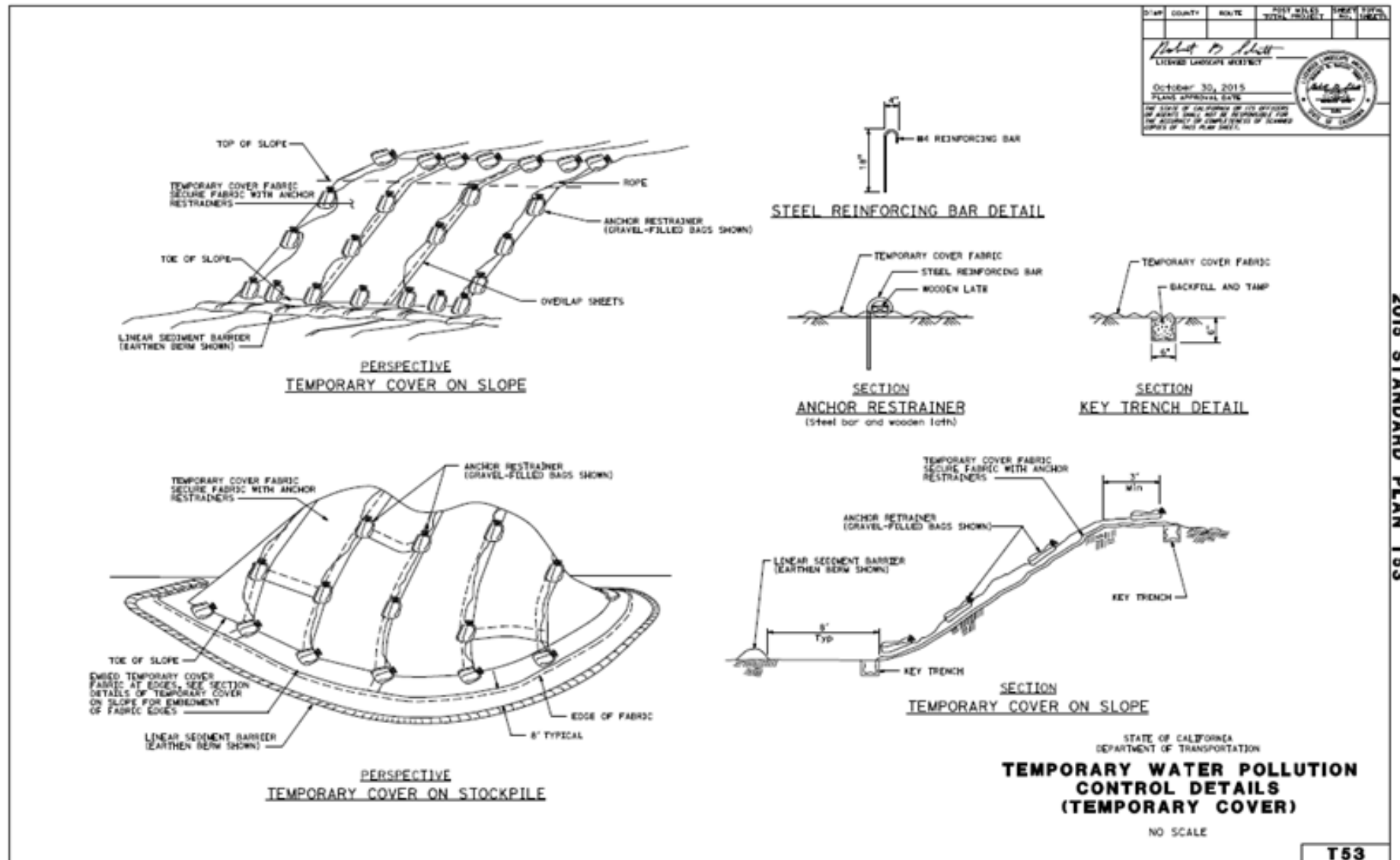
Stockpile Management areas must be shown on the WPCDs and reflect site conditions.

SWPPP or WPCP

Stockpile Management must be discussed in Section 500.4.2 of the SWPPP or Section 30.3.2 of the WPCP.

Stockpile Management

WM-3





Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☒

Definition and Purpose

These procedures and practices are implemented to prevent and control spills in a manner that minimizes or prevents the discharge of spilled material to the drainage system or watercourses.

Appropriate Applications

This best management practice (BMP) applies to all construction projects. Spill control procedures are implemented anytime chemicals and/or hazardous substances are stored. Substances may include, but are not limited to:

- Soil stabilizers/binders.
- Dust Palliatives.
- Herbicides.
- Growth inhibitors.
- Fertilizers.
- Deicing/anti-icing chemicals.
- Fuels.
- Lubricants.
- Other petroleum distillates.

To the extent that the work can be accomplished safely, spills of oil, petroleum products, substances listed under 40 CFR parts 110, 117, and 302, and sanitary and septic wastes shall be contained and cleaned up immediately.

Limitations

This BMP only applies to spills caused by the contractor. Other spills or discharges observed or discovered must be reported to the RE.

Procedures and practices presented in this BMP are general. Contractor shall identify appropriate practices for the specific materials used or stored on-site and follow the appropriate Safety Data Sheets (SDS).

Standards and Specifications

Must comply with Caltrans Standard Specifications 13-4.03B Spill Prevention and Control.

To the extent that it doesn't compromise clean-up activities, spills shall be covered and protected from stormwater run-on.

Spills shall not be buried or washed with water. Potable water has chlorine and therefore should not be allowed to be discharged off the project site.

Used clean up materials, contaminated materials, and recovered spill material that is no longer suitable for the intended purpose shall be stored and properly disposed of.

Water used for cleaning and decontamination shall not be allowed to enter storm drains or watercourses and shall be collected and disposed of in accordance with WM-10, "Liquid Waste Management."

Water overflow or minor water spillage shall be contained and shall not be allowed to discharge into drainage facilities or watercourses.

Proper storage, clean-up and spill reporting instruction for hazardous materials stored or used on the project site shall be posted at all times in an open, conspicuous and accessible location.

Waste storage areas shall be kept clean, well-organized and equipped with ample clean-up supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers and liners shall be repaired or replaced as needed to maintain proper function.

Education

Educate employees and subcontractors on what a "significant spill" is for each material they use, and what is the appropriate response for "significant" and "insignificant" spills.

Educate employees and subcontractors on potential dangers to humans and the environment from spills and leaks.

Hold regular meetings to discuss and reinforce appropriate disposal procedures (incorporate into regular safety meetings).

Establish a continuing education program to indoctrinate new employees.

The WPC Manager shall oversee and enforce proper spill prevention and control measures.

The list of reportable quantities can be found at
<https://www.bnl.gov/esh/env/compliance/docs/SaraTitleList.pdf>.

Cleanup and Storage Procedures

Minor Spills:

- Minor spills typically involve small quantities of oil, gasoline, paint, etc., which can be controlled by the first responder at the discovery of the spill.
- Use absorbent materials on small spills rather than hosing down or burying the spill.
- Remove the absorbent materials promptly and dispose of properly.
- The practice commonly followed for a minor spill is:
 - Contain the spread of the spill.
 - Recover spilled materials.
 - Clean the area and/or properly dispose of contaminated materials.

Semi-Significant Spills:

- Semi-significant spills still can be controlled by the first responder along with the aid of other personnel such as laborers and the foreman, etc. This response may require the cessation of all other activities.

Clean-up spills immediately:

- Notify the WPC Manager immediately. The WPC Manager shall notify the RE and prepare the proper notifications as required.

Contain spread of the spill.

- If the spill occurs on paved or impermeable surfaces, clean up using "dry" methods (absorbent materials, cat litter and/or rags). Contain the spill by encircling with absorbent materials.
- If the spill occurs in dirt areas, immediately contain the spill. Dig up and properly dispose of contaminated soil.
- If the spill occurs during rain, cover spill with tarps to prevent contaminating runoff.

Significant/Hazardous Spills:

- For significant or hazardous spills that cannot be controlled by personnel in the immediate vicinity, the following steps shall be taken:
 - Notify the RE immediately and follow up with a written report.
 - Notify the local emergency response by dialing 911. In addition to 911, the contractor will notify the proper county officials. It is the contractor's responsibility to have all emergency phone numbers at the construction site.
 - Notify the Governor's Office of Emergency Services Warning Center, (800) 852-7550 or 1-916-845-8911.
 - For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110, 119, and 302, the contractor shall notify the National Response Center at (800) 424-8802.
 - Notification shall first be made by telephone and followed up with a written report. The reporting form is located at <http://www.caloes.ca.gov/FireRescueSite/Documents/304%20-%20Written%20Report%20Form.pdf>.

- The services of a spills contractor or a Haz-Mat team shall be obtained immediately. Construction personnel shall not attempt to clean up the spill until the appropriate and qualified staff have arrived at the job site.
- Other agencies which may need to be consulted include, but are not limited to, the Fire Department, the Public Works Department, the Coast Guard, the Highway Patrol, the City/County Police Department, Department of Toxic Substances, California Division of Oil and Gas, Cal/OSHA, RWQCB, etc.

Maintenance and Inspection

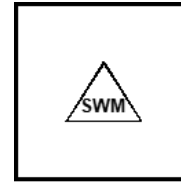
Verify weekly that spill control clean-up materials are located near material storage, unloading, and use areas.

Update spill prevention and control plans and stock appropriate clean-up materials when changes occur in the types of chemicals used or stored onsite.

Improper clean-up might trigger need for water quality or soil testing. The WPC Manager should be proactive in ensuring controls are in place and adequate to contain and prevent further issues.

SWPPP or WPCP

Spill Prevention and Control must be discussed in Section 500.4 of the SWPPP or Section 30.3.2 of the WPCP.



Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☒

Definition and Purpose

Solid waste management procedures and practices are designed to minimize or eliminate the discharge of pollutants to the drainage system or to water bodies as a result of the creation, stockpiling, or removal of construction site wastes.

Appropriate Applications

Solid waste management procedures and practices are implemented on all construction projects that generate solid wastes.

Solid wastes include but are not limited to:

- Construction wastes including brick, mortar, timber, steel and metal scraps, sawdust, pipe and electrical cuttings, non-hazardous equipment parts, styrofoam and other materials used to transport and package construction materials.
- Highway planting wastes, including vegetative material, plant containers, and packaging materials.
- Litter, including food containers, beverage cans, coffee cups, paper bags, plastic wrappers, and smoking materials, including litter generated by the public.

Limitations

None identified.

Standards and Specifications

Education

The WPC Manager shall oversee and enforce proper solid waste procedures and practices.

Instruct employees and subcontractors on identification of solid waste and hazardous waste.

Educate employees and subcontractors on solid waste storage and disposal procedures.

Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings and tailgate sessions).

Require that employees and subcontractors follow solid waste handling and storage procedures.

Prohibit littering by employees, subcontractors, and visitors.

Wherever possible, minimize production of solid waste materials.

Must comply with Standard specification 14-10 Solid Waste Disposal and Recycling and 13-4 Job Site Handling.

Collection, Storage, and Disposal

Dumpsters of sufficient size and number shall be provided to contain the solid waste generated by the project and be properly serviced. Must ensure that containers are watertight and have a cover.

Littering on the project site shall be prohibited.

To prevent clogging of the storm drainage system, litter and debris removal from drainage grates, trash racks, and ditch lines shall be a priority.

Trash receptacles shall be provided in the Contractor's yard, field trailer areas, and at locations where workers congregate for lunch and break periods.

Construction debris and litter from work areas within the construction limits of the project site shall be collected and placed in watertight dumpsters at least weekly regardless of whether the litter was generated by the Contractor, the public, or others. Collected litter and debris shall not be placed in or next to drain inlets, storm water drainage systems or watercourses.

Full dumpsters shall be removed from the project site and the contents shall be disposed of outside the highway right-of-way in conformance with the provisions in the Standard Specifications Section 14-10 Solid Waste Disposal and Recycling.

Litter stored in collection areas and containers shall be handled and disposed of by trash hauling contractors.

Construction material visible to the public shall be stored or stacked in an orderly manner to the satisfaction of the RE.

Stormwater run-on shall be prevented from contacting stored solid waste by berms, dikes, or other temporary diversion structures or through the use of measures to elevate waste from site surfaces.

Solid waste storage areas shall be located at least 50 ft. from drainage facilities and watercourses and shall not be located in areas prone to flooding or ponding.

Except during fair weather, construction and highway planting waste not stored in watertight dumpsters shall be securely covered from wind and rain by covering the waste with tarps or plastic sheeting.

Dumpster washout on the project site is not allowed.

Notify trash hauling contractors that only watertight dumpsters are acceptable for use on-site.

Plan for additional containers during the demolition phase of construction.

Plan for more frequent pickup during the demolition phase of construction.

Construction waste shall be stored in a designated area and shown in the WPCDs.

Segregate potentially hazardous waste from non-hazardous construction site waste.

Keep the site clean of litter debris.

Make sure that toxic liquid wastes (e.g., used oils, solvents, and paints) and chemicals (e.g., acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.

Dispose of non-hazardous waste in accordance with Standard Specification 14-10 Solid Waste Disposal and Recycling.

For disposal of hazardous waste, see BMP WM-6, "Hazardous Waste Management." Have hazardous waste hauled to an appropriate disposal and/or recycling facility.

Salvage or recycle useful vegetation debris, packaging and/or surplus building materials when practical. For example, trees and shrubs from land clearing can be converted into wood chips, then used as mulch on graded areas. Wood pallets, cardboard boxes, and construction scraps can also be recycled.

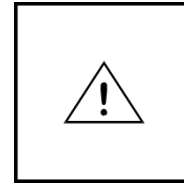
Maintenance and Inspection

The WPC Manager shall monitor onsite solid waste storage and disposal procedures.

Specific locations for Solid Waste Storage or Containment must be shown in the WPCDs and must be inspected and maintained regularly.

SWPPP or WPCP

Solid Waste Management must be discussed in Section 500.4 of the SWPPP or Section 30.3.2 of the WPCP.



Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☒

Definition and Purpose

These are procedures and practices to minimize or eliminate the discharge of pollutants from construction site hazardous waste to the storm drain systems or to watercourses.

Appropriate Applications

This best management practice (BMP) applies to all construction projects.

Hazardous waste management practices are implemented on construction projects that generate waste from the use of:

- Petroleum Products
- Asphalt Products
- Concrete Curing Compounds
- Pesticides
- Palliatives
- Acids
- Paints
- Stains
- Solvents
- Septic Wastes
- Wood Preservatives
- Roofing Tar, or
- Any materials deemed a hazardous waste in California, Title 22 Division 4.5, or listed in 40 CFR Parts 110, 117, 261, or 302.

Limitations

Nothing in this BMP relieves the Contractor from responsibility for compliance with federal, state, and local laws regarding storage, handling, transportation, and disposal of hazardous wastes.

This BMP does not cover aerially deposited lead (ADL) soils. For ADL soils refer to WM-7, “Contaminated Soil Management,” and the project special provisions.

Standards and Specifications

Education

Educate employees and subcontractors on hazardous waste storage and disposal procedures.

Educate employees and subcontractors on potential dangers to humans and the environment from hazardous wastes.

Instruct employees and subcontractors on safety procedures for common construction site hazardous wastes.

Instruct employees and subcontractors in identification of hazardous and solid waste.

Hold regular meetings to discuss and reinforce hazardous waste management procedures (incorporate into regular safety meetings and tailgate sessions).

The WPC Manager must oversee and enforce proper hazardous waste management procedures and practices.

Make sure that hazardous waste is collected, removed, and disposed of only at authorized disposal areas.

Storage Procedures

Wastes shall be stored in sealed containers constructed of a suitable material and shall be labeled as required by Title 22 CCR, Division 4.5 and 49 CFR Parts 172, 173, 177 and 178, 179.

All hazardous waste shall be stored, transported, and disposed as required in Title 22 CCR, Division 4.5 and 49 CFR 261-263.

Waste containers shall be stored in temporary containment facilities that shall comply with the following requirements:

- Temporary containment facility shall provide for a spill containment volume able to contain precipitation from a 24-hour, 25-year storm event, plus the greater of ten percent of the aggregate volume of all containers or 100 percent of the capacity of the largest tank within its boundary, whichever is greater.
- Temporary containment facility shall be impervious to the materials stored there for a minimum contact time of 72 hours.
- Temporary containment facilities shall be maintained free of accumulated rainwater and spills. In the event of spills or leaks accumulated rainwater and spills shall be placed into drums after each rainfall. These liquids shall be handled as a hazardous waste unless testing determines them to be non-hazardous. Non-hazardous liquids shall be sent to an approved disposal site.
- Sufficient separation shall be provided between stored containers to allow for spill cleanup and emergency response access.

- Incompatible materials, such as chlorine and ammonia, shall not be stored in the same temporary containment facility.
- Temporary containment facilities shall be covered during non-working days, and prior to rain events. Covered facilities may include use of plastic tarps for small facilities or constructed roofs with overhangs. A storage facility having a solid cover and sides is preferred to a temporary tarp. Storage facilities shall be equipped with adequate ventilation.

Drums shall not be overfilled and wastes shall not be mixed.

Unless watertight, containers of dry waste shall be stored on pallets.

Paint brushes and equipment for water and oil based paints shall be cleaned within a contained area and shall not be allowed to contaminate site soils, watercourses or drainage systems. Waste paints, thinners, solvents, residues, and sludges that cannot be recycled or reused shall be disposed of as hazardous waste. When thoroughly dry, latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths shall be disposed of as solid waste.

Ensure that adequate hazardous waste storage volume is available.

Ensure that hazardous waste collection containers are conveniently located.

Designate hazardous waste storage areas on site away from storm drains or watercourses and away from moving vehicles and equipment to prevent accidental spills.

Minimize production or generation of hazardous materials and hazardous waste on the job site.

Use containment berms in fueling and maintenance areas and where the potential for spills is high.

Segregate potentially hazardous waste from non-hazardous construction site debris.

Keep liquid or semi-liquid hazardous waste in appropriate containers (closed drums or similar) and under cover.

Clearly label all hazardous waste containers with the waste being stored and the date of accumulation.

Place hazardous waste containers in secondary containment.

Do not allow potentially hazardous waste materials to accumulate on the ground.

Do not mix wastes.

Disposal Procedures

Waste shall be disposed of outside the highway right of way within 90 days of being generated, or as directed by the RE. In no case, shall hazardous waste storage exceed requirements in Title 22 CCR, Section 66262.34.

Waste shall be disposed of by a licensed hazardous waste transporter at an authorized and licensed disposal facility or recycling facility utilizing properly completed Uniform Hazardous Waste Manifest forms.

An ELAP accredited laboratory shall sample waste and analyze it to determine the appropriate disposal facility.

Make sure that toxic liquid wastes (e.g., used oils, solvents, and paints) and chemicals (e.g., acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for solid waste construction debris.

Properly dispose of rainwater in secondary containment that may have mixed with hazardous waste.

Recycle any useful material such as used oil or water-based paint when practical.

Attention is directed to "Hazardous Material", "Contaminated Material", and "Aerially Deposited Lead" of the contract documents regarding the handling and disposal of hazardous materials.

Maintenance and Inspection

The WPC Manager or QSP shall monitor on-site hazardous waste storage and disposal procedures.

Waste storage areas shall be kept clean, well-organized, and equipped with ample clean up supplies as appropriate for the materials being stored.

Storage areas shall be inspected in conformance with the provisions in the contract documents. At a minimum, storage areas must be inspected before, daily during extended storm event, after every storm event and weekly year-round. Perimeter controls, containment structures, covers, and liners shall be repaired or replaced as needed to maintain proper function.

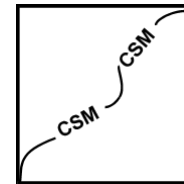
Hazardous spills shall be cleaned up and reported in conformance with the applicable Safety Data Sheet (SDS) and the instructions posted at the project site.

The National Response Center, at (800) 424-8802, shall be notified of spills of Federal reportable quantities in conformance with the requirements in 40 CFR parts 110, 117, and 302.

Copy of the hazardous waste manifests shall be provided to the RE.

SWPPP or WPCP

Hazardous Waste Management must be discussed in Section 500.4 of the SWPPP or Section 30.3 of the WPCP.



Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☒

Definition and Purpose

These are procedures and practices to minimize or eliminate the discharges of pollutants to the drainage system or to receiving waters from contaminated soil.

Appropriate Applications

Contaminated soil management is implemented on construction projects where soil contamination may have occurred due to spills, illicit discharges, and leaks from underground storage tanks.

It may also apply to highway widening projects in older areas where median and shoulder soils may have been contaminated by aerially deposited lead (ADL).

Limitations

The procedures and practices presented in this best management practice (BMP) are general. The contractor shall identify appropriate practices and procedures consistent with the plans and specifications for the specific contaminants known to exist or discovered on site.

Standards and Specifications

Identifying Contaminated Areas

Contaminated soils are often identified during project planning and development with known locations identified in the plans and specifications. The contractor shall review applicable reports and examine applicable call-outs in the plans and specifications.

The contractor may discover contaminated soils not identified in the plans and specifications by observing:

Spills and leaks, discoloration, odors or abandoned underground tanks or pipes.

Spills and leaks caused by the contractor are the contractor's responsibility for removal, testing, and disposal.

If unanticipated asbestos or hazardous substances are discovered, that were not released by the contractor, the contractor shall stop work in that area and immediately notify the RE. The contractor shall not resume work in the area until directed to do so.

Education

Prior to performing any excavation work at the locations containing material classified as hazardous, employees and subcontractors shall complete a safety training program which meets 29 CFR 1910.120 and 8 CCR 5192 covering the potential hazards as identified.

Educate employees and subcontractors in identification of contaminated soil and on contaminated soil handling, containment and disposal procedures.

Hold regular meetings to discuss and reinforce contaminated soil handling, containment and disposal procedures (incorporate into regular safety meetings and tailgates).

Handling Procedures for Material with Aerially Deposited Lead (ADL)

Materials from areas designated as containing (ADL) may, if allowed by the contract special provisions, be excavated, transported, and used in the construction of embankments and/or backfill.

Must comply with Standard specification requirements outlined in Section 14-11 Hazardous Waste and Contamination.

Must comply with the DTSC ADL agreement for specific requirements regarding handling, stockpiling and hauling of material.

Excavation, transportation, and placement operations shall result in no visible dust.

Use caution to prevent spillage of lead containing material during transport.

Monitor the air quality during excavation of soils contaminated with lead.

Handling Procedures for Contaminated Soils

Contaminated soil shall be disposed of properly in compliance with the specifications and all applicable regulations. in Title 22, CCR, Division 4.5 and section 14-11 of the specifications.

If required by the specifications test contaminated soils at a SWRCB ELAP certified laboratory.

If the soil is contaminated, work with the local regulatory agencies to develop options for treatment and/or disposal.

Avoid temporary stockpiling of contaminated soils or hazardous material.

If temporary stockpiling is allowed by the specifications.

Place plastic sheeting or tarps underneath material and cover the stockpile with plastic sheeting or tarps if required by the specifications.

Install a berm around the stockpile to prevent run-on or run-off from leaving the area.

Do not stockpile in or near storm drains or receiving water.

Install berms or run-on controls to prevent stormwater from commingling with contaminated areas.

Contaminated material and hazardous material on exteriors of transport vehicles shall be removed and placed either into the current transport vehicle or the excavation prior to the vehicle leaving the exclusion zone.

Monitor the air quality during excavation operations if required.

Procure all permits and licenses, pay all charges and fees, and give all notices necessary and incident to the due and lawful prosecution of the work, including registration for transporting vehicles carrying the contaminated material and the hazardous material.

Collect water from decontamination procedures and treat and/or dispose of it at an appropriate disposal site.

Collect non-reusable protective equipment, once used by any personnel, and dispose of at an appropriate disposal site.

Install temporary security fence to surround and secure the exclusion zone. Remove fencing when no longer needed.

Excavation, transport, and disposal of contaminated material and hazardous material shall be in accordance with the rules and regulations of the following agencies (the specifications of these agencies supersede the procedures outlined in this BMP):

- United States Department of Transportation (USDOT).
- United States Environmental Protection Agency (USEPA).
- California Environmental Protection Agency (CAL-EPA).
- California Division of Occupation Safety and Health Administration (CAL-OSHA).
- Local regulatory agencies.

Procedures for Underground Storage Tank Removals

If an unknown underground storage tank is discovered, the contractor shall stop work in that area and immediately notify the RE. The contractor shall not resume work in the area until directed to do so.

If tank removal operations are required by the contract, follow the contract requirements for obtaining permits and approval from the federal, state, and local agencies, which have jurisdiction over such work.

If tank removal operations are required by the contract, the underground storage tank, any liquid and/or sludge found within the tank, and all contaminated substances and hazardous substances removed during the tank removal shall be transported to disposal facilities as required by the contract Specifications.

Water Control

Take all necessary precautions and preventive measures to prevent the flow of water, including ground water, from mixing with contaminated or hazardous materials or entering contaminated soil excavations. Such preventative measures may consist of, but are not limited to: berms, cofferdams, grout curtains, freeze walls, and seal course concrete or any combination thereof.

If water does enter an excavation and becomes contaminated, such water, when necessary to proceed with the work, shall be dewatered consistent with NS-2, “Dewatering Operations” and the Caltrans Field Guide to Construction Site Dewatering Manual, and in compliance with the specifications.

Maintenance and Inspection

The WPC Manager shall monitor on-site contaminated soil storage and disposal procedures.

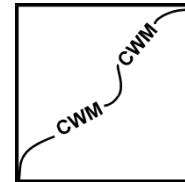
Monitor the air quality during excavation operations if required

Manage contaminated soils and hazardous substances/waste under the appropriate federal, state, and local requirements.

Inspect stockpiles, hazardous waste receptacles and storage areas regularly.

SWPPP or WPCP

Contaminated Soil Management must be discussed in Section 500.4 of the SWPPP or Section 30.3.2 of the WPCP.



Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☒

Definition and Purpose

These are procedures and practices that are designed to minimize or eliminate the discharge of concrete waste materials to the storm drain systems or watercourses.

Appropriate Applications

Concrete waste management procedures and practices are implemented on construction projects where concrete is used as a construction material or where concrete dust and debris result from demolition activities.

Where slurries containing portland cement concrete (PCC) or asphalt concrete (AC) are generated, such as from sawcutting, coring, grinding, grooving, and hydro-concrete demolition.

Where concrete trucks and other concrete-coated equipment are washed on site, when approved by the Resident Engineer (RE). See also NS-8, "Vehicle and Equipment Cleaning."

Where mortar-mixing stations exist.

Limitations

None identified.

Standards and Specifications

Education

Educate employees, subcontractors, and suppliers on the concrete waste management techniques described herein.

The WPC Manager shall oversee and enforce concrete waste management procedures.

Concrete Demolition Wastes

Stockpile concrete demolition wastes in accordance with BMP WM-3, “Stockpile Management.”

Disposal of hardened PCC and AC waste shall be in conformance with Standard Specifications Section 14-10 Solid Waste Disposal and Recycling.

Concrete Slurry Waste Management and Disposal

PCC and AC waste shall not be allowed to enter storm drainage systems or watercourses.

A sign shall be installed adjacent to each temporary concrete washout facility to inform concrete equipment operators to utilize the proper facilities.

The WPCM must ensure that onsite concrete working tasks are being monitored, such as saw cutting, coring, grinding and grooving to ensure proper methods are implemented.

Residue from saw cutting, coring and grinding operations shall be picked up by means of a vacuum device. Residue shall not be allowed to flow across the pavement and shall not be left on the surface of the pavement. See also NS-3, “Paving and Grinding Operations.”

Vacuumed slurry residue shall be disposed in accordance with WM-5, “Solid Waste Management” and Standard Specifications Section 7-1.13. Slurry residue shall be temporarily stored in a facility as described in “Onsite Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures” below), or within an impermeable containment vessel or bin.

Collect and dispose of all residues from grooving and grinding operations in accordance with Standard Specifications Section 14-10 Solid Waste Disposal and Recycling and Standard Specifications 14-11 Hazardous Waste and Contamination.

Onsite Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures

Temporary concrete washout facilities shall be located a minimum of 50 ft. from storm drain inlets, open drainage facilities, and watercourses, unless determined infeasible by the RE. Each facility shall be located away from construction traffic or access areas to prevent disturbance or tracking.

A sign shall be installed adjacent to each washout facility to inform concrete equipment operators to utilize the proper facilities. The sign shall be installed as shown on the plans and in conformance with the provisions in Standard Specifications Section 56 2, Overhead Sign Structure.

Temporary concrete washout facilities shall be constructed above grade or below grade at the option of the Contractor. Temporary concrete washout facilities shall be constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.

Temporary washout facilities shall have a temporary pit or bermed areas of sufficient volume to completely contain all liquid and waste concrete materials generated during washout procedures.

Perform washout of concrete mixers, delivery trucks, and other delivery systems in designated areas only.

Wash concrete only from mixer chutes into approved concrete washout facility. Washout may be collected in an impermeable bag or other impermeable containment devices for disposal.

Pump excess concrete in concrete pump bin back into concrete mixer truck.

Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and discharged into designated washout area or properly disposed offsite.

Once concrete wastes are washed into the designated area and allowed to harden, the concrete shall be broken up, removed, and disposed of in conformance with the provisions in Standard Specifications Section 7-1.13 or 15 3.02.

Temporary Concrete Washout Facility Type “Above Grade”

Temporary concrete washout facility Type “Above Grade” shall be constructed as shown on Page 6 or 7, with a recommended minimum length and minimum width of 10 ft, but with sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations. The length and width of a facility may be increased, at the Contractor’s expense, upon approval from the RE.

Straw bales, wood stakes, and sandbag materials shall conform to the provisions in SC-9, "Straw Bale Barrier."

Plastic lining material shall be a minimum of 10-mil polyethylene sheeting and shall be free of holes, tears or other defects that compromise the impermeability of the material. Liner seams shall be installed in accordance with manufacturers’ recommendations.

Portable delineators shall conform to the provisions in Standard Specifications Section 12 3.04, "Portable Delineators." The delineator bases shall be cemented to the pavement in the same manner as provided for cementing pavement markers to pavement. Portable delineators shall be applied only to a clean, dry surface.

Temporary Concrete Washout Facility (Type Below Grade)

Temporary concrete washout facility Type “Below Grade” shall be constructed as shown on page 6, with a recommended minimum length and minimum width of 10 ft. The quantity and volume shall be sufficient to contain all liquid and concrete waste generated by washout operations. The length and width of a facility may be increased, at the Contractor’s expense, upon approval of the RE. Lath and flagging shall be commercial type.

Plastic lining material shall be a minimum of 10-mil polyethylene sheeting and shall be free of holes, tears or other defects that compromise the impermeability of the material. Liner seams shall be installed in accordance with manufacturers’ recommendations.

The soil base shall be prepared free of rocks or other debris that may cause tears or holes in the plastic lining material.

Temporary washout facilities shall implement BMPs to prevent run-on and run-off from the facility.

Removal of Temporary Concrete Washout Facilities

When temporary concrete washout facilities are no longer required for the work, as determined by the RE, the hardened concrete shall be removed and disposed of. Disposal of PCC dried residues, slurries or liquid waste shall be disposed of outside the highway right-of-way in conformance with provisions of Standard Specifications Section 7-1-13. Materials used to construct temporary concrete washout facilities shall become

the property of the Contractor, shall be removed from the site of the work, and shall be disposed of outside the highway right-of-way.

Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities shall be backfilled and repaired in conformance with the provisions in Standard Specifications Section 15 1.02, "Preservation of Property."

Maintenance and Inspection

Inspect Concrete Waste Management areas before, during and after rainfall events, and at least weekly during other times.

The WPC Manager shall monitor concrete working tasks, such as sawcutting, coring, grinding and grooving daily to ensure proper methods are employed or as directed by the RE.

Temporary concrete washout facilities shall be maintained to provide adequate holding capacity with a minimum freeboard of 4 inches for above grade facilities and 12 inches for below grade facilities.

Maintaining temporary concrete washout facilities shall include removing and disposing of hardened concrete and returning the facilities to a functional condition.

Hardened concrete materials shall be removed and disposed of in conformance with the provisions in Standard Specifications Section 7-1.13 or 15 3.02.

Existing facilities must be cleaned, or new facilities must be constructed and ready for use once the washout is 75% full.

Temporary concrete washout facilities shall be inspected for damage (i.e. tears in polyethylene liner, missing sandbags, etc.). Damaged facilities shall be repaired.

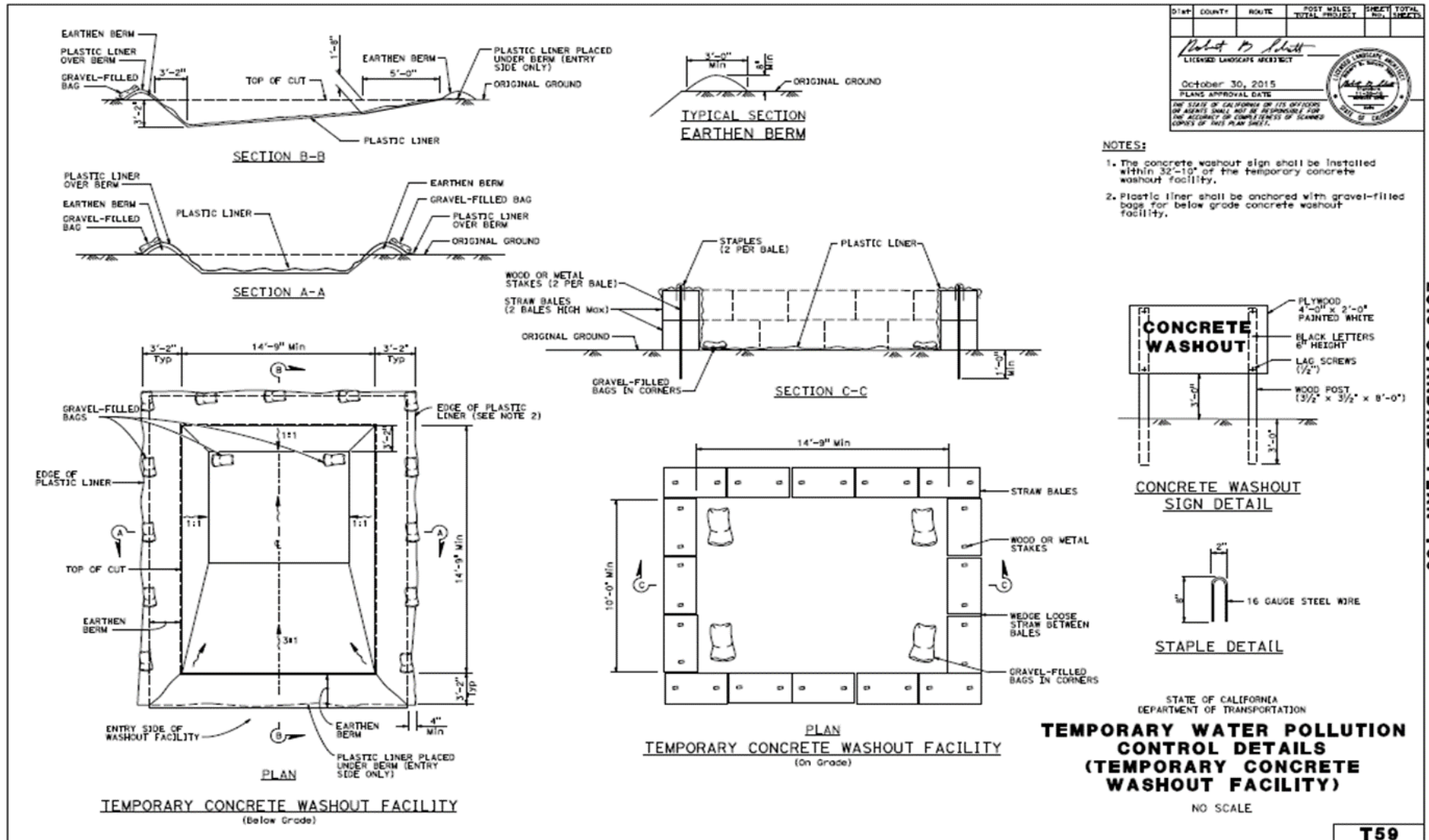
Inspection and Maintenance of these areas must be properly documented and ensure no potential for discharges occur from these areas as part of the non-visible monitoring requirements.

SWPPP or WPCP

Concrete Waste Management must be discussed in Section 500.4.2 of the SWPPP or Section 30.3.2 of the WPCP.

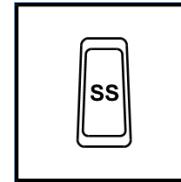
Concrete Waste Management

WM-8



2015 STANDARD PLAN T59





Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☒

Definition and Purpose

Procedures and practices to minimize or eliminate the discharge of construction site sanitary and septic waste materials to the storm drain system or to receiving waters.

Appropriate Applications

Sanitary/septic waste management practices are implemented on all construction sites that use temporary or portable sanitary and septic waste systems.

Limitations

None identified.

Standards and Specifications

Education

Educate employees, subcontractors, and suppliers on sanitary and septic waste storage and disposal procedures.

Educate employees, subcontractors, and suppliers of potential dangers to humans and the environment from sanitary/septic wastes.

Instruct employees, subcontractors, and suppliers in identification of sanitary/septic waste.

Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings and tailgates).

Establish a continuing education program to indoctrinate new employees.

Storage and Disposal Procedures

Temporary sanitary facilities shall be located away from drainage facilities, receiving waters, and from traffic circulation.

When subjected to high winds or risk for overtopping, temporary systems must be properly secured.

Wastewater shall not be discharged or buried within the highway right-of-way.

Sanitary and septic systems that discharge directly into sanitary sewer systems, where permissible, shall comply with the local health agency, city, county, and sewer district requirements.

If using an on-site disposal system, such as a septic system, comply with local health agency requirements.

Properly connect temporary sanitary facilities that discharge to the sanitary sewer system to avoid illicit discharges.

Ensure that sanitary and septic facilities are maintained in good working order by a licensed service.

Use only reputable, licensed sanitary/septic waste haulers.

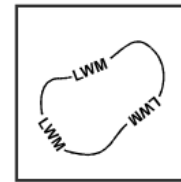
Maintenance and Inspection

Inspect onsite sanitary and septic waste storage and disposal procedures at least weekly, prior to a forecasted rain event, daily during extended rain events and post-storm events.

Locations for portable Sanitary Systems must be shown on the WPCDs and reflect current site conditions.

SWPPP or WPCP

Sanitary and Septic Waste Management must be discussed in Section 500.4.2 of the SWPPP or Section 30.3.2 of the WPCP.



Standard Symbol

BMP Objectives	
Soil Stabilization	☐
Sediment Control	☐
Tracking Control	☐
Wind Erosion Control	☐
Non-Stormwater Management	☐
Materials and Waste Management	☒

Definition and Purpose

Procedures and practices to prevent discharge of pollutants to the storm drain system or to receiving waters as a result of the creation, collection, and disposal of non-hazardous liquid wastes.

Appropriate Applications

Liquid waste management is applicable to construction projects that generate any of the following non-hazardous byproducts, residuals, or wastes:

- Drilling slurries and drilling fluids.
- Grease-free and oil-free wastewater and rinse water.
- Dredgings.
- Other non-storm water liquid discharges not permitted by separate permits.

Limitations

Disposal of some liquid wastes may be subject to specific laws and regulations, or to requirements of other permits secured for the construction project (e.g., NPDES permits, Army Corps permits, Coastal Commission permits, etc.).

Does not apply to dewatering operations (see NS-2, “Dewatering Operations”), solid waste management (see WM-5, “Solid Waste Management”), hazardous wastes (see WM-6, “Hazardous Waste Management”), or concrete slurry residue (see WM-8, “Concrete Waste Management”).

Does not apply to non-stormwater discharges permitted by any NPDES permit held by the pertinent Caltrans District, unless the discharge is determined by Caltrans to be a source of pollutants. Typical permitted non-stormwater discharges can include: water line flushing; landscape irrigation; diverted stream flows; rising ground waters; uncontaminated pumped ground water; discharges from potable water sources; foundation

drains; irrigation water; springs; water from crawl space pumps; footing drains; lawn watering; flows from riparian habitats and wetlands; and, discharges or flows from emergency firefighting activities. See 2016 SWMP for complete list of permitted non-stormwater discharges.

Standards and Specifications

General Practices

Must comply with Standard Specification 13-4.03 Spill Prevention and Control.

The WPC Manager shall oversee and enforce proper liquid waste management procedures and practices.

Instruct employees and subcontractors how to safely differentiate between non-hazardous liquid waste and potential or known hazardous liquid waste.

Instruct employees, subcontractors, and suppliers that it is unacceptable for any liquid waste to enter any storm drainage structure, waterway, or receiving water.

Educate employees and subcontractors on liquid waste generating activities, and liquid waste storage and disposal procedures.

Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings and tailgates).

Verify which non-stormwater discharges are permitted by the Caltrans NPDES permit; different regions might have different requirements not outlined in this permit. Some listed discharges may be prohibited if Caltrans determines the discharge to be a source of pollutants.

Apply the NS-8, “Vehicle and Equipment Cleaning” BMP for managing wash water and rinse water from vehicle and equipment cleaning operations.

Containing Liquid Wastes

Drilling residue and drilling fluids shall not be allowed to enter storm drains and receiving waters and shall be disposed of outside the highway right of way in conformance with the provisions in Standard Specifications.

If an appropriate location is available, as determined by the RE, drilling residue and drilling fluids that are exempt under California Code of Regulations (CCR) Title 23 §2511(g) may be dried by infiltration and evaporation in a containment facility constructed in conformance with the provisions concerning the Temporary Concrete Washout Facilities detailed in WM-08, “Concrete Waste Management.”

Liquid wastes generated as part of an operational procedure, such as water-laden dredged material and drilling mud, shall be contained and not allowed to flow into drainage channels or receiving waters prior to treatment.

Contain liquid wastes in a controlled area, such as a holding pit, sediment basin, roll-off bin, or portable tank.

Containment devices must be structurally sound and leak free.

Containment devices must be of sufficient quantity or volume to completely contain the liquid wastes generated.

Take precautions to avoid spills or accidental releases of contained liquid wastes. Apply the education measures and spill response procedures outlined in WM-4, “Spill Prevention and Control.”

Do not locate containment areas or devices where accidental release of the contained liquid can threaten health or safety, or discharge to water bodies, channels, or storm drains.

Capturing Liquid Wastes

Capture all liquid wastes running off a surface, which has the potential to affect the storm drainage system, such as wash water and rinse water from cleaning walls or pavement.

Do not allow liquid wastes to flow or discharge uncontrolled. Use temporary dikes or berms to intercept flows and direct them to a containment area or device for capture.

If the liquid waste is sediment laden, use a sediment trap SC-3, “Sediment Trap/Curb Cutback” for capturing and treating the liquid waste stream, or capture in a containment device and allow sediment to settle.

Disposing of Liquid Wastes

Typical method is to dewater the contained liquid waste, using procedures such as described in NS-2, “Dewatering Operations”, and SC-2, “Sediment/Desilting Basin”; and dispose of resulting solids per WM-5, “Solid Waste Management.”

Method of disposal for some liquid wastes may be prescribed in Water Quality Reports, NPDES permits, Environmental Impact Reports, 401 Water Quality Certifications or 404 permits, local agency discharge permits, etc., and may be defined elsewhere in the special provisions.

Liquid wastes, such as from dredged material, may require testing and certification whether it is hazardous or not before a disposal method can be determined.

For disposal of hazardous waste, see WM-6, “Hazardous Waste Management.”

If necessary, further treat liquid wastes prior to disposal. Treatment may include, though is not limited to, sedimentation, filtration, and chemical neutralization.

Maintenance and Inspection

Inspect onsite sanitary and septic waste storage and disposal procedures at least weekly, prior to a forecasted rain event, daily during extended rain events and post-storm events.

Locations for portable Sanitary Systems must be shown on the WPCDs and reflect current site conditions.

SWPPP or WPCP

Sanitary and Septic Waste Management must be discussed in Section 500.4.2 of the SWPPP or Section 30.3.2 of the WPCP.

Appendix A

Definition of Terms

Active Areas. An area where soil disturbing activities have occurred at least once within 14 days.

Areas of Construction. All areas subject to land surface disturbance activities related to the project including, but not limited to, project staging areas, immediate access areas and storage areas.

Active Treatment System (ATS). A treatment system that employs chemical coagulation, chemical flocculation, or electrocoagulation to aid in the reduction of turbidity caused by fine suspended sediment.

Air Deposition. Airborne particulates from construction activities.

Best Available Technology Economically Achievable (BAT). As defined by USEPA, BAT is a technology-based standard established by the CWA as the most appropriate means available on a national basis for controlling the direct discharge of toxic and nonconventional pollutants to navigable waters. The BAT effluent limitations guidelines, in general, represent the best existing performance of treatment technologies that are economically achievable within an industrial point source category or subcategory.

Best Conventional Pollutant Control Technology (BCT). As defined by USEPA, BCT is a technology-based standard for the discharge from existing industrial point sources of conventional pollutants including BOD, total suspended sediment (TSS), fecal coliform, pH, oil and grease.

Best Management Practices (BMPs). BMPs are scheduling of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants. BMPs also include treatment requirements, operating procedures, and practices to control site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Caltrans Permit. The Caltrans Statewide NPDES Permit for discharges from Caltrans properties, facilities, and activities (Order No. 2012-011-DWQ, NPDES No. CAS000003), issues by the SWRCB.

Construction Activity. Includes clearing, grading, or excavation and Contractor activities that result in soil disturbance.

Construction Site. The area involved in a construction project as a whole.

Construction Site BMPs. Temporary control practices (BMPs) that are required only temporarily to address a short-term stormwater contamination threat as a result of construction activities. For example, silt fences are located near the base of newly graded slopes that have substantial area of exposed soil. Then, during rainfall, the silt fences allow capture of sediment from erosion of the slopes.

Contractor. Party responsible for carrying out the contract per plans and specifications. The Standard Specifications and contract special provisions contain stormwater protection requirements the Contractor must address.

Contractor-Support Facilities. Contractor-support facilities include: Staging areas, storage yards for equipment and materials, mobile operations, batch plants for Portland Cement Concrete and Hot Mix Asphalt, crushing plants for rock and aggregate, other facilities installed for Contractor convenience such as haul roads.

Debris. Litter, rubble, discarded refuse, and remains of destroyed inorganic anthropogenic waste.

Direct Discharge. When surface runoff directly enters the surface water body without first flowing through a municipal separate storm sewer system (MS4).

Discharge. Any release, spill, leak, pump, flow, escape, dumping, or disposal of any liquid, semi-solid or solid substance.

Disturbed Soil Areas (DSAs). Areas of exposed, erodible soil, including stockpiles, that are within the construction limits and that result from construction activities.

Drainage Area. The area of land that drains water, sediment, pollutants, and dissolved materials to a common outlet.

Effluent. Any discharge of water by a discharger either to the receiving water or beyond the property boundary controlled by the discharger.

Environmental Protection Agency (EPA). Agency that issued the regulations to control pollutants in stormwater runoff discharges (The Clean Water Act and NPDES permit requirements).

Erosion. The process, by which soil particles are detached and transported by the actions of wind, water, or gravity.

Erosion Control BMPs. Vegetation, such as grasses and wildflowers, and other materials, such as straw, fiber, stabilizing emulsion, protective blankets, etc., placed to stabilize areas of disturbed soils, reduce loss of soil due to the action of water or wind, and prevent water pollution.

Exempt Construction Activities. Activities exempt from the CGP, including routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of the facility; and emergency construction activities required to protect public health and safety. Local permits may not exempt these activities.

Existing vegetation. Any vegetated area that has not already been cleared and grubbed.

Final Stabilization. All soil disturbing activities at each individual parcel within the site have been completed in a manner consistent with the requirements in this General Permit.

Forecasted Storm Event. A storm that produces or is forecasted to produce at least 0.10 inch of precipitation within a 24-hour period.

General Permit. The Construction General Permit for Storm Water Discharges Associated with Construction Activity (Order No. 2009-000-DWQ, NPDES Permit CAS000002) and amendments (Order No. 2010-0014-DWQ and Order No. 2012-0006-DWQ) issued by the SWRCB.

Good Housekeeping. A common practice related to the storage, use, or cleanup of materials, performed in a manner that minimizes the discharge of pollutants.

Good Housekeeping BMPs. BMPs designed to reduce or eliminate the addition of pollutants to construction site runoff through analysis of pollutant sources, implementation of proper handling/disposal practices, employee education, and other actions. Grading Phase (part of the Grading and Land Development Phase) includes reconfiguring the topography and slope including; alluvium removals; canyon cleanouts; rock undercuts; keyway excavations; land form grading; and stockpiling of select material for capping operations.

Illegal Connection. Discarding or disposal within the Caltrans right-of-way, properties or facilities, either intentionally or unintentionally, of trash or other wastes in non-designated areas that may contribute to stormwater pollution.

Illegal Dumping. An engineered conveyance that is connected to an MS4 without authorization by local, state, or federal statutes, ordinances, codes or regulations.

Illicit Discharge. Any discharge to an MS4 that is prohibited under local, state, or federal statutes, ordinances, codes or regulations. It includes all non-stormwater discharges except conditionally exempt non-stormwater discharges.

Inactive Construction Area. Any area not considered to be an active construction area. Active construction areas become inactive construction areas whenever construction activities are expected to be discontinued for a period of 14 days or longer.

Indirect Discharge. When surface runoff enters the surface water body through an MS4 stormwater conveyance system or unlisted tributary before reaching the surface water.

National Pollutant Discharge Elimination System (NPDES) Permit. A permit issued pursuant to the CWA that requires the discharge of pollutants to waters of the United States from stormwater be controlled.

Non-Storm Water Discharges. Non-Storm Water Discharges are discharges that do not originate from forecasted storm events. They can include, but are not limited to, discharges of process water, air conditioner condensate, non-contact cooling water, vehicle wash water, sanitary wastes, concrete washout water, paint wash water, irrigation water, or pipe testing water.

Non-Visible Pollutants. Pollutants associated with a specific site or activity that can have a negative impact on water quality, but cannot be seen through observation (ex: chlorine). Such pollutants being discharged are not authorized.

pH. Unit universally used to express the intensity of the acid or alkaline condition of a water sample. The pH of natural waters tends to range between 6 and 9, with neutral being 7. Extremes of pH can have deleterious effects on aquatic systems.

Pollution. The man-made or man-induced alteration of the chemical, physical, biological, and radiological integrity of water. An alteration of the quality of the water of the state by waste to a degree, which unreasonably affects either the waters for beneficial uses or facilities that serve these beneficial uses.

Post-Construction BMPs. Structural and non-structural controls which detain, retain, or filter the release of pollutants to receiving waters after final stabilization is attained.

Qualified SWPPP Developer (QSD). Individual who is authorized to develop and revise SWPPPs.

Qualified SWPPP Practitioner (QSP). Individual assigned responsibility for non-storm water and storm water visual observations, sampling and analysis, and responsibility to ensure full compliance with the permit and implementation of all elements of the SWPPP, including the preparation of the annual compliance evaluation and the elimination of all unauthorized discharges.

Receiving Waters. All surface water bodies within the permit area.

Regional Water Quality Control Board (RWQCB). California agencies that implement and enforce CWA Section 402(p) NPDES permit requirements, and are issuers and administrators of these permits as delegated by USEPA. There are nine regional boards working with the SWRCB.

Resident Engineer (RE). The Caltrans representative charged with administration of construction contracts. The RE decides questions regarding acceptability of material furnished and work performed. The RE has "contractual authority" to direct the Contractor and impose sanctions if the Contractor fails to take prompt and appropriate action to correct deficiencies. The following contractual sanctions can be imposed by the RE: (a) withholding payments (or portions of payments), (b) suspending work, (c) bringing in a separate Contractor to complete work items (the Contractor is billed for such costs), (d) assessing liquidated damages including passing along fines for permit violations, (e) initiating cancellation of the construction contract.

Routine Maintenance. Activities intended to maintain the original line and grade, hydraulic capacity, or original purpose of a facility.

Runoff Control BMPs. Measures used to divert run-on from off-site and runoff within the site.

Runoff Effect. The effect that a particular soil stabilization product has on the production of stormwater runoff. Runoff from an area protected by a particular product may be compared to the amount of runoff measured for bare soil

Run-on. Discharges that originate off-site and flow onto the property of a separate project site.

Sediment. Solid particulate matter, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice and has come to rest on the earth's surface either above or below sea level.

Sedimentation. Process of deposition of suspended matter carried by water, wastewater, or other liquids, by gravity. It is usually accomplished by reducing the velocity of the liquid below the point at which it can transport the suspended material.

Sediment Control BMPs. Practices that trap soil particles after they have been eroded by rain, flowing water, or wind. They include those practices that intercept and slow or detain the flow of storm water to allow sediment to settle and be trapped (e.g., silt fence, sediment basin, fiber rolls, etc.).

Sheet Flow. Flow of water that occurs overland in areas where there are no defined channels where the water spreads out over a large area at a uniform depth.

Soil Amendment. Any material that is added to the soil to change its chemical properties, engineering properties, or erosion resistance that could become mobilized by storm water.

State Water Resources Control Board (SWRCB). California agency that implements and enforces CWA Section 402(p) NPDES permit requirements, is issuer and administrator of these permits as delegated by EPA. Works with the nine Regional Water Quality Control Boards.

Storm Drain System. Streets, gutters, inlets, conduits, natural or artificial drains, channels and watercourses, or other facilities that are owned, operated, maintained and used for the purpose of collecting, storing, transporting, or disposing of stormwater.

Stormwater. Rainfall runoff, snow melt runoff, and surface runoff and drainage. It excludes infiltration and runoff from agricultural land.

Stormwater Pollution Prevention Plan (SWPPP). A plan required by the CGP or the LTCGP that includes site map(s), an identification of construction/contractor activities that could cause pollutants in the stormwater, and a description of measures or practices to control these pollutants. It must be prepared and authorized before construction begins. A SWPPP prepared in accordance with the Special Provisions and the Handbooks will satisfy Standard Specifications Section 13 Water Pollution Control

Temporary Construction Site BMPs. Construction Site BMPs that are required only temporarily to address a short-term stormwater contamination threat. For example, silt fences are located near the base of newly graded slopes that have a substantial area of exposed soil. Then, during rainfall, the silt fences filter and collect sediment from runoff flowing off the slope.

Water Pollution Control Manager (WPC Manager). The person responsible for the implementation of the SWPPP or WPCP, whichever is applicable for the project. The WPC Manager must be a QSP whenever the project requires a WPCP. The WPC Manager must be a QSD whenever the project requires a SWPPP.

Water Pollution Control Program (WPCP). A WPCP is a plan to identify water quality management practices to be implemented that must be prepared for all construction projects that do not require preparation of a SWPPP. For Caltrans projects disturbing more than one acre, a SWPPP satisfies the requirement for a WPCP.

Waters of the United States. Generally, refers to surface waters, as defined by the federal Environmental Water quality objectives are defined in the California Water Code as limits or levels of water quality constituents or characteristics, which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area.

Appendix B: Selection of Temporary Soil Stabilization Controls

Appendix C: Active Treatment Systems

APPENDIX K

NOI & ACKNOWLEDGEMENT LETTER FROM EPA/STATE

Appendix L – SWPPP Amendment Log

Project Name: Sunrise Ranch Park
SWPPP QSD: Matt Vinson

Amendment No.	Description of the Amendment	Date of Amendment	QSD signature

APPENDIX M

ADDITIONAL INFORMATION

Delegation of Authority Form

Delegation of Authority

I, _____ (name), hereby designate the person or specifically described position below to be a duly authorized representative for the purpose of overseeing compliance with environmental requirements, including the Construction General Permit, at the _____ construction site. The designee is authorized to sign any reports, storm water pollution prevention plans and all other documents required by the permit.

_____ (name of person or position)
_____ (company)
_____ (address)
_____ (city, state, zip)
_____ (phone)

By signing this authorization, I confirm that I meet the requirements to make such a designation as set forth in _____ (Reference State Permit), and that the designee above meets the definition of an “Approved Signatory” as set forth in _____ (Reference State Permit).

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name: _____

Company: _____

Title: _____

Signature: _____

Date: _____